Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Purchase Order

Order Date: 01-26-2023

CORRECT ORDER NUMBER MUST APPEAR ON ALL PACKAGES, INVOICES, AND SHIPPING PAPERS. QUESTIONS CONCERNING THIS ORDER SHOULD BE DIRECTED TO THE DEPARTMENT CONTACT.

Order Number:	CPO 0211 4025 GSD2300000013 1	**Procurement Folder:**	1122181
Document Name:	Building 25 HVAC Renovations	**Reason for Modification:**	
Document Description:	Building 25 HVAC Renovations	Award of CRFQ GSD2300000020	
Procurement Type:	Central Purchase Order		
Buyer Name:	Melissa Pettrey		
Telephone:	(304) 558-0094		
Email:	melissa.k.pettrey@wv.gov		
Shipping Method:	Best Way	**Effective Start Date:**	
Free on Board:	FOB Dest, Freight Prepaid	**Effective End Date:**	

VENDOR

Vendor Customer Code: 000000206308
CP&H INC
1500 MORGANTOWN INDUSTRIAL PARK

MORGANTOWN WV 26501-2339
US
Vendor Contact Phone: 304-296-7135 **Extension:**

Discount Details:

	Discount Allowed	Discount Percentage	Discount Days
#1	No	0.0000	0
#2	Not Entered		
#3	Not Entered		
#4	Not Entered		

DEPARTMENT CONTACT

Requestor Name: Patrick S O'Neill
Requestor Phone: 304-352-5492
Requestor Email: patrick.s.oneill@wv.gov

23
FILE LOCATION _____

INVOICE TO

DEPARTMENT OF ADMINISTRATION
GENERAL SERVICES DIVISION
103 MICHIGAN AVENUE
CHARLESTON WV 25305
US

SHIP TO

DEPARTMENT OF ADMINISTRATION
GENERAL SERVICES DIVISION BLDG 25
5TH & AVERY
PARKERSBURG WV 26105
US

1/30/2023

Total Order Amount:	$2,325,400.00

Purchasing Division's File Copy

ENTERED

MKP 01/27/2023

PURCHASING DIVISION AUTHORIZATION	ATTORNEY GENERAL APPROVAL AS TO FORM	ENCUMBRANCE CERTIFICATION
DATE: 1/27/2023	DATE: 1/30/2023	DATE: Beverly Toler 1-30-2023
ELECTRONIC SIGNATURE ON FILE	ELECTRONIC SIGNATURE ON FILE	ELECTRONIC SIGNATURE ON FILE

Extended Description:

One-Time Purchase
Construction

The Vendor, CP&H, Inc., of Morgantown, WV agrees to enter into this one-time construction contract with the Department of Administration, General Services Division to provide all labor, materials, equipment, and incidentals for Renovations to the HVAC system of Building 25, located at 5th & Avery Streets, Parkersburg, WV 26105. per the bid requirements, specifications, terms and conditions the information from The Project manual and Drawings as Developed by the Architect: Miller Engineering; the information from Addendum No.01, dated; 11/17/2022, Addendum No.02, dated: 11/18/2022, Addendum No. 3 dated 12/09/2022; Addendum No. 4 dated 12/12/2022; The Vendor's submitted and accepted bid dated 12/20/2022 all incorporated herein by reference and made apart of hereof as also attached.

Line	Commodity Code	Quantity	Unit	Unit Price	Total Price
1	72151201	0.00000		0.000000	2325400.00
Service From	**Service To**	**Manufacturer**		**Model No**	

Commodity Line Description: Building 25 HVAC Renovations

Extended Description:
Building 25 HVAC Renovations

GENERAL TERMS AND CONDITIONS:

1. CONTRACTUAL AGREEMENT: Issuance of an Award Document signed by the Purchasing Division Director, or his designee, and approved as to form by the Attorney General's office constitutes acceptance by the State of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid, or on the Contract if the Contract is not the result of a bid solicitation, signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

2. DEFINITIONS: As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

2.1. "Agency" or **"Agencies"** means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

2.2. "Bid" or **"Proposal"** means the vendors submitted response to this solicitation.

2.3. "Contract" means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

2.4. "Director" means the Director of the West Virginia Department of Administration, Purchasing Division.

2.5. "Purchasing Division" means the West Virginia Department of Administration, Purchasing Division.

2.6. "Award Document" means the document signed by the Agency and the Purchasing Division, and approved as to form by the Attorney General, that identifies the Vendor as the contract holder.

2.7. "Solicitation" means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

2.8. "State" means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

2.9. "Vendor" or **"Vendors"** means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

3. CONTRACT TERM; RENEWAL; EXTENSION: The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

☐ **Term Contract**

Initial Contract Term: The Initial Contract Term will be for a period of _____ _____. The Initial Contract Term becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as _____), and the Initial Contract Term ends on the effective end date also shown on the first page of this Contract.

Renewal Term: This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any request for renewal should be delivered to the Agency and then submitted to the Purchasing Division thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Unless otherwise specified below, renewal of this Contract is limited to _____ successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed the total number of months available in all renewal years combined. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

☐ **Alternate Renewal Term** – This contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

Delivery Order Limitations: In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

☑ **Fixed Period Contract:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within Three-Hundred (300) days.

☐ **Fixed Period Contract with Renewals:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within _____ days. Upon completion of the work covered by the preceding sentence, the vendor agrees that:

☐ the contract will continue for _____ years;

☐ the contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's Office (Attorney General approval is as to form only).

☐ **One-Time Purchase:** The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

☐ **Construction/Project Oversight:** This Contract becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as _____), and continues until the project for which the vendor is providing oversight is complete.

☐ **Other:** Contract Term specified in _____

4. AUTHORITY TO PROCEED: Vendor is authorized to begin performance of this contract on the date of encumbrance listed on the front page of the Award Document unless either the box for "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked in Section 3 above. If either "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked, Vendor must not begin work until it receives a separate notice to proceed from the State. The notice to proceed will then be incorporated into the Contract via change order to memorialize the official date that work commenced.

5. QUANTITIES: The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

☐ **Open End Contract:** Quantities listed in this Solicitation/Award Document are approximations only, based on estimates supplied by the Agency. It is understood and agreed that the Contract shall cover the quantities actually ordered for delivery during the term of the Contract, whether more or less than the quantities shown.

☐ **Service:** The scope of the service to be provided will be more clearly defined in the specifications included herewith.

☑ **Combined Service and Goods:** The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

☐ **One-Time Purchase:** This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General's office.

☐ **Construction:** This Contract is for construction activity more fully defined in the specifications.

6. EMERGENCY PURCHASES: The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute of breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One-Time Purchase contract.

7. REQUIRED DOCUMENTS: All of the items checked in this section must be provided to the Purchasing Division by the Vendor as specified:

☐ **LICENSE(S) / CERTIFICATIONS / PERMITS:** In addition to anything required under the Section of the General Terms and Conditions entitled Licensing, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits upon request and in a form acceptable to the State. The request may be prior to or after contract award at the State's sole discretion.

☐

☐

☐

☐

The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications regardless of whether or not that requirement is listed above.

8. INSURANCE: The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below prior to Contract award. The insurance coverages identified below must be maintained throughout the life of this contract. Thirty (30) days prior to the expiration of the insurance policies, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies, including but not limited to, policy cancelation, policy reduction, or change in insurers. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether that insurance requirement is listed in this section.

Vendor must maintain:

☑ **Commercial General Liability Insurance** in at least an amount of: $1,000,000.00 per occurrence.

☑ **Automobile Liability Insurance** in at least an amount of: $1,000,000.00 per occurrence.

☐ **Professional/Malpractice/Errors and Omission Insurance** in at least an amount of: _____ per occurrence. Notwithstanding the forgoing, Vendor's are not required to list the State as an additional insured for this type of policy.

☑ **Commercial Crime and Third Party Fidelity Insurance** in an amount of: 100,000.00 per occurrence.

☐ **Cyber Liability Insurance** in an amount of: _____ per occurrence.

☐ **Builders Risk Insurance** in an amount equal to 100% of the amount of the

Contract. [ ] **Pollution Insurance** in an amount of: _____ per

☐currence.

☐ **Aircraft Liability** in an amount of: _____ per occurrence.

☐

☐

☐

☐

9. WORKERS' COMPENSATION INSURANCE: Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

10. VENUE: All legal actions for damages brought by Vendor against the State shall be brought in the West Virginia Claims Commission. Other causes of action must be brought in the West Virginia court authorized by statute to exercise jurisdiction over it.

11. LIQUIDATED DAMAGES: This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy. Vendor shall pay liquidated damages in the amount specified below or as described in the specifications:

☐ _____ for _____.

☑ Liquidated Damages Contained in the Specifications.

☐ Liquidated Damages Are Not Included in this Contract.

12. ACCEPTANCE: Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

13. PRICING: The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification. Notwithstanding the foregoing, Vendor must extend any publicly advertised sale price to the State and invoice at the lower of the contract price or the publicly advertised sale price.

14. PAYMENT IN ARREARS: Payments for goods/services will be made in arrears only upon receipt of a proper invoice, detailing the goods/services provided or receipt of the goods/services, whichever is later. Notwithstanding the foregoing, payments for software maintenance, licenses, or subscriptions may be paid annually in advance.

15. PAYMENT METHODS: Vendor must accept payment by electronic funds transfer and P-Card. (The State of West Virginia's Purchasing Card program, administered under contract by a banking institution, processes payment for goods and services through state designated credit cards.)

16. TAXES: The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

17. ADDITIONAL FEES: Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia, included in the Contract, or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

18. FUNDING: This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available. If that occurs, the State may notify the Vendor that an alternative source of funding has been obtained and thereby avoid the automatic termination. Non-appropriation or non-funding shall not be considered an event of default.

19. CANCELLATION: The Purchasing Division Director reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Purchasing Division Director may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

20. TIME: Time is of the essence regarding all matters of time and performance in this Contract.

21. APPLICABLE LAW: This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code, or West Virginia Code of State Rules is void and of no effect.

22. COMPLIANCE WITH LAWS: Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

> **SUBCONTRACTOR COMPLIANCE:** Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to comply with all applicable laws, regulations, and ordinances. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

23. ARBITRATION: Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

24. MODIFICATIONS: This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any change to existing contracts that adds work or changes contract cost, and were not included in the original contract, must be approved by the Purchasing Division and the Attorney General's Office (as to form) prior to the implementation of the change or commencement of work affected by the change.

25. WAIVER: The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

26. SUBSEQUENT FORMS: The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

27. ASSIGNMENT: Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency, the Purchasing Division, the Attorney General's office (as to form only), and any other government agency or office that may be required to approve such assignments.

28. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

29. STATE EMPLOYEES: State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

30. PRIVACY, SECURITY, AND CONFIDENTIALITY: The Vendor agrees that it will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the Agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the Agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in http://www.state.wv.us/admin/purchase/privacy/default.html.

31. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

32. LICENSING: In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Purchasing Division Director or the Agency to verify that the Vendor is licensed and in good standing with the above entities.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to be licensed, in good standing, and up-to-date on all state and local obligations as described in this section. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

33. ANTITRUST: In submitting a bid to, signing a contract with, or accepting a Award Document from any agency of the State of West Virginia, the Vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to Vendor.

34. VENDOR NON-CONFLICT: Neither Vendor nor its representatives are permitted to have any interest, nor shall they acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency.

35. VENDOR RELATIONSHIP: The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing.

Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

36. INDEMNIFICATION: The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

37. NO DEBT CERTIFICATION: In accordance with West Virginia Code §§ 5A-3-10a and 5-22-1(i), the State is prohibited from awarding a contract to any bidder that owes a debt to the State or a political subdivision of the State. By submitting a bid, or entering into a contract with the State, Vendor is affirming that (1) for construction contracts, the Vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, neither the Vendor nor any related party owe a debt as defined above, and neither the Vendor nor any related party are in employer default as defined in the statute cited above unless the debt or employer default is permitted under the statute.

38. CONFLICT OF INTEREST: Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

39. REPORTS: Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

☑ Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

☐ Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at purchasing.division@wv.gov.

40. BACKGROUND CHECK: In accordance with W. Va. Code § 15-2D-3, the State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check. Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS: Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.

b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open heath, basic oxygen, electric furnace, Bessemer or other steel making process.

c. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:

    1. The cost for each contract item used does not exceed one tenth of one percent (.1%) of the total contract cost or two thousand five hundred dollars ($2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or

    2. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL: In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars ($50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a "substantial labor surplus area", as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

43. INTERESTED PARTY SUPPLEMENTAL DISCLOSURE: W. Va. Code § 6D-1-2 requires that for contracts with an actual or estimated value of at least $1 million, the Vendor must submit to the Agency a disclosure of interested parties prior to beginning work under this Contract. Additionally, the Vendor must submit a supplemental disclosure of interested parties reflecting any new or differing interested parties to the contract, which were not included in the original pre-work interested party disclosure, within 30 days following the completion or termination of the contract. A copy of that form is included with this solicitation or can be obtained from the WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.

44. PROHIBITION AGAINST USED OR REFURBISHED: Unless expressly permitted in the solicitation published by the State, Vendor must provide new, unused commodities, and is prohibited from supplying used or refurbished commodities, in fulfilling its responsibilities under this Contract.

45. VOID CONTRACT CLAUSES: This Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

46. ISRAEL BOYCOTT: Bidder understands and agrees that, pursuant to W. Va. Code § 5A-3-63, it is prohibited from engaging in a boycott of Israel during the term of this contract.

ADDITIONAL TERMS AND CONDITIONS (Construction Contracts Only)

1. CONTRACTOR'S LICENSE: Until June 15, 2021, West Virginia Code § 21-11-2, and after that date, § 30-42-2, requires that all persons desiring to perform contracting work in this state be licensed. The West Virginia Contractors Licensing Board is empowered to issue the contractor's license. Applications for a contractor's license may be made by contacting the West Virginia Contractor Licensing Board.

The apparent successful Vendor must furnish a copy of its contractor's license prior to the issuance of a contract award document.

2. BONDS: The following bonds must be submitted:

a. **BID BOND:** Pursuant to the requirements contained in W. Va. Code § 5-22-1(c), All Vendors submitting a bid on a construction project shall furnish a valid bid bond in the amount of five percent (5%) of the total amount of the bid protecting the State of West Virginia. **THE BID BOND MUST BE SUBMITTED WITH THE BID OR VENDOR'S BID WILL BE DISQUALIFIED.**

b. **PERFORMANCE BOND:** The apparent successful Vendor shall provide a performance bond in the amount of 100% of the contract. The performance bond must be received by the Purchasing Division prior to Contract award.

c. **LABOR/MATERIAL PAYMENT BOND**: The apparent successful Vendor shall provide a labor/material payment bond in the amount of 100% of the Contract value. The labor/material payment bond must be delivered to the Purchasing Division prior to Contract award.

d. **MAINTENANCE BOND:** The apparent successful Vendor shall provide a two (2) year maintenance bond covering the roofing system if the work impacts an existing roof. The amount of the bond must be equal to the price associated with the percentage of the project impacting the roof. The maintenance bond must be issued and delivered to the Purchasing Division prior to Contract award.

In lieu of the Bid Bond, the Vendor may provide certified checks, cashier's checks, or irrevocable letters of credit. Any certified check, cashier's check, or irrevocable letter of credit provided in lieu of the bid bond must be of the same amount required of the Bid Bond and delivered with the bid.

3. DRUG-FREE WORKPLACE AFFIDAVIT: W. Va. Code § 21-1D-5 provides that any solicitation for a public improvement contract requires each Vendor that submits a bid for the work to submit an affidavit that the Vendor has a written plan for a drug-free workplace policy. If the affidavit is not submitted with the bid submission, the Purchasing Division shall promptly request by telephone and electronic mail that the low bidder and second low bidder provide the affidavit within one business day of the request. Failure to submit the affidavit within one business day of receiving the request shall result in disqualification of the bid. To comply with this law, Vendor should complete the enclosed drug-free workplace affidavit and submit the

same with its bid. Failure to submit the signed and notarized drugfree workplace affidavit or a similar affidavit that fully complies with the requirements of the applicable code, within one business day of being requested to do so shall result in disqualification of Vendor's bid. Pursuant to W. Va. Code 21-1D-2(b) and (k), this provision does not apply to public improvement contracts the value of which is $100,000 or less or temporary or emergency repairs.

3.1. DRUG-FREE WORKPLACE POLICY: Pursuant to W. Va. Code § 21-1D-4, Vendor and its subcontractors must implement and maintain a written drug-free workplace policy that complies with said article. The awarding public authority shall cancel this contract if: (1) Vendor fails to implement and maintain a written drug-free workplace policy described in the preceding paragraph, (2) Vendor fails to provide information regarding implementation of its drug-free workplace policy at the request of the public authority; or (3) Vendor provides to the public authority false information regarding the contractor's drug-free workplace policy.

Pursuant to W. Va. Code 21-1D-2(b) and (k), this provision does not apply to public improvement contracts the value of which is $100,000 or less or temporary or emergency repairs.

4. DRUG FREE WORKPLACE REPORT: Pursuant to W. Va. Code § 21-1D-7b, no less than once per year, or upon completion of the project, every contractor shall provide a certified report to the public authority which let the contract. For contracts over $25,000, the public authority shall be the West Virginia Purchasing Division. For contracts of $25,000 or less, the public authority shall be the agency issuing the contract. The report shall include:

(1) Information to show that the education and training service to the requirements of West Virginia Code § 21-1D-5 was provided;

(2) The name of the laboratory certified by the United States Department of Health and Human Services or its successor that performs the drug tests;

(3) The average number of employees in connection with the construction on the public improvement;

(4) Drug test results for the following categories including the number of positive tests and the number of negative tests: (A) Pre-employment and new hires; (B) Reasonable suspicion; (C) Post-accident; and (D) Random.

Vendor should utilize the attached Certified Drug Free Workplace Report Coversheet when submitting the report required hereunder. Pursuant to W. Va. Code 21-1D-2(b) and (k), this provision does not apply to public improvement contracts the value of which is $100,000 or less or temporary or emergency repairs.

5. AIA DOCUMENTS: All construction contracts that will be completed in conjunction with architectural services procured under Chapter 5G of the West Virginia Code will be governed by the attached AIA documents, as amended by the Supplementary Conditions for the State of West Virginia, in addition to the terms and conditions contained herein.

6. PROHIBITION AGAINST GENERAL CONDITIONS: Notwithstanding anything contained in the AIA Documents or the Supplementary Conditions, the State of West Virginia will not pay for general conditions, or winter conditions, or any other condition representing a delay in the contracts. The Vendor is expected to mitigate delay costs to the greatest extent possible and any costs associated with Delays must be specifically and concretely identified. The state will not consider an average daily rate multiplied by the number of days extended to be an acceptable charge.

7. GREEN BUILDINGS MINIMUM ENERGY STANDARDS: In accordance with § 22-29-4, all new building construction projects of public agencies that have not entered the schematic design phase prior to July 1, 2012, or any building construction project receiving state grant funds and appropriations, including public schools, that have not entered the schematic design phase prior to July 1, 2012, shall be designed and constructed complying with the ICC International Energy Conservation Code, adopted by the State Fire Commission, and the ANSI/ASHRAE/IESNA Standard 90.1-2007: Provided, That if any construction project has a commitment of federal funds to pay for a portion of such project, this provision shall only apply to the extent such standards are consistent with the federal standards.

8. LOCAL LABOR MARKET HIRING REQUIREMENT: Pursuant to West Virginia Code §21-1C-1 et seq., Employers shall hire at least seventy-five percent of employees for public improvement construction projects from the local labor market, to be rounded off, with at least two employees from outside the local labor market permissible for each employer per project.

Any employer unable to employ the minimum number of employees from the local labor market shall inform the nearest office of Workforce West Virginia of the number of qualified employees needed and provide a job description of the positions to be filled.

If, within three business days following the placing of a job order, Workforce West Virginia is unable to refer any qualified job applicants to the employer or refers less qualified job applicants than the number requested, then Workforce West Virginia shall issue a waiver to the employer stating the unavailability of applicant and shall permit the employer to fill any positions covered by the waiver from outside the local labor market. The waiver shall be in writing and shall be issued within the prescribed three days. A waiver certificate shall be sent to both the employer for its permanent project records and to the public authority.

Any employer who violates this requirement is subject to a civil penalty of $250 per each employee less than the required threshold of seventy-five percent per day of violation after receipt of a notice of violation.

Any employer that continues to violate any provision of this article more than fourteen calendar days after receipt of a notice of violation is subject to a civil penalty of $500 per each employee less than the required threshold of seventy-five percent per day of violation.

The following terms used in this section have the meaning shown below.

(1) The term "construction project" means any construction, reconstruction, improvement, enlargement, painting, decorating or repair of any public improvement let to contract in an amount equal to or greater than $500,000. The term "construction project" does not include temporary or emergency repairs;

(2) The term "employee" means any person hired or permitted to perform hourly work for wages by a person, firm or corporation in the construction industry; The term "employee" does not include:(i) Bona fide employees of a public authority or individuals engaged in making temporary or emergency repairs;(ii) Bona fide independent contractors; or(iii) Salaried supervisory personnel necessary to assure efficient execution of the employee's work;

(3) The term "employer" means any person, firm or corporation employing one or more employees on any public improvement and includes all contractors and subcontractors;

(4) The term "local labor market" means every county in West Virginia and any county outside of West Virginia if any portion of that county is within fifty miles of the border of West Virginia;

(5) The term "public improvement" includes the construction of all buildings, roads, highways, bridges, streets, alleys, sewers, ditches, sewage disposal plants, waterworks, airports and all other structures that may be let to contract by a public authority, excluding improvements funded, in whole or in part, by federal funds.

9. DAVIS-BACON AND RELATED ACT WAGE RATES:

☐ The work performed under this contract is federally funded in whole, or in part. Pursuant to _____, Vendors are required to pay applicable Davis-Bacon wage rates.

☑ The work performed under this contract is not subject to Davis-Bacon wage rates.

10. SUBCONTRACTOR LIST SUBMISSION: In accordance with W. Va. Code § 5-22-1, the apparent low bidder on a contract valued at more than $250,000.00 for the construction, alteration, decoration, painting or improvement of a new or existing building or structure shall submit a list of all subcontractors who will perform more than $25,000.00 of work on the project including labor and materials. (This section does not apply to any other construction projects, such as highway, mine reclamation, water or sewer projects.) The subcontractor list shall be provided to the Purchasing Division within one business day of the opening of bids for review.
If the apparent low bidder fails to submit the subcontractor list, the Purchasing Division shall promptly request by telephone and electronic mail that the low bidder and second low bidder provide the subcontractor list within one business day of the request. Failure to submit the subcontractor list within one business day of receiving the request shall result in disqualification of the bid.

If no subcontractors who will perform more than $25,000.00 of work are to be used to complete the project, the apparent low bidder must make this clear on the subcontractor list, in the bid itself, or in response to the Purchasing Division's request for the subcontractor list.

a. Required Information. The subcontractor list must contain the following information:

i. Bidder's name

ii. Name of each subcontractor performing more than $25,000 of work on the project.

iii. The license number of each subcontractor, as required by W. Va. Code § 21-11-1 et. seq.

iv. If applicable, a notation that no subcontractor will be used to perform more than $25,000.00 of work. (This item iv. is not required if the vendor makes this clear in the bid itself or in documentation following the request for the subcontractor list.)

b. Subcontractor List Submission Form: The subcontractor list may be submitted in any form, including the attached form, as long as the required information noted above is included. If any information is missing from the bidder's subcontractor list submission, it may be obtained from other documents such as bids, emails, letters, etc. that accompany the subcontractor list submission.

c. Substitution of Subcontractor. Written approval must be obtained from the State Spending Unit before any subcontractor substitution is permitted. Substitutions are not permitted unless:

i. The subcontractor listed in the original bid has filed for bankruptcy;

ii. The subcontractor in the original bid has been debarred or suspended; or

iii. The contractor certifies in writing that the subcontractor listed in the original bid fails, is unable, or refuses to perform his subcontract.

Subcontractor List Submission (Construction Contracts Only)

Bidder's Name: CP&H Inc

☐ Check this box if no subcontractors will perform more than $25,000.00 of work to complete the project.

Subcontractor Name	License Number if Required by W. Va. Code § 21-11-1 et. seq.
Magnum Construction	058456
Mountain State Electrical	051949
Tri State Roofing	004542
Trane	Vendor

Attach additional pages if necessary

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title) Jay Wade- President

(Address) 1500 Morgantown Industrial Park, Morgantown WV 26501

(Phone Number) / (Fax Number) 304-296-7135

(email address) jay@cphwv.com

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through *wv*OASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

CP&H Inc.
(Company)

(Signature of Authorized Representative)

Jay Wade-President
(Printed Name and Title of Authorized Representative) (Date)

304-296-7135
(Phone Number) (Fax Number)

jay@cphwv.com
(Email Address)

GENERAL CONSTRUCTION SPECIFICATIONS

1. **PURPOSE AND SCOPE:** The West Virginia Purchasing Division is soliciting bids on behalf of the Department of Administration, General Services Division to establish a contract for Renovations to the HVAC system of Building 25, located at 5th & Avery Streets, Parkersburg, WV 26105. Miller Engineering is serving as the Engineer on this project.

2. **Definitions:** The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions and in the Specification's Manual as defined below.

   2.1. **"Construction Services"** means HVAC system renovations as more fully described in these specifications and the Specifications/Project Manual.

   2.2. **"Pricing Page"** means the pages contained in wvOASIS, attached hereto as Exhibit A, and included in the Specifications/Project Manual upon which Vendor should list its proposed price for the Construction Services.

   2.3. **"Solicitation"** means the official notice of an opportunity to supply the State with Construction Services that is published by the Purchasing Division.

   2.4. **"Specifications/Project Manual"** means the American Institute of Architect forms, specifications, plans, drawings, and related documents developed by the architect, engineer, or Agency that provide detailed instructions on how the Construction Services are to be performed along with any American Institute of Architects documents ("AIA documents") attached thereto.

3. **ORDER OF PRECEDENCE:** This General Construction Specifications document will have priority over, and supersede, anything contained in the Specifications/Project Manual.

4. **Qualifications:** Vendor, or Vendor's staff if requirements are inherently limited to individuals rather than corporate entities, shall have the following minimum qualifications:

   4.1. **Experience:** Vendor, or Vendor's supervisory staff assigned to this project, must have successfully completed at least Three (3) projects that involved work similar to that described in the Specifications/Project Manual. Compliance with this experience requirement will be determined prior to contract award by the State through references provided by the Vendor upon request, through knowledge or

documentation of the Vendor's past projects, through confirmation of experience requirements from the architect assisting the State in this project, or some other method that the State determines to be acceptable. Vendor must provide any documentation requested by the State to assist in confirmation of compliance with this provision. References, documentation, or other information to confirm compliance with this experience requirement may be requested after bid opening and prior to contract award.

5. **CONTRACT AWARD:** The Contract is intended to provide Agency with a purchase price for the Construction Services. The Contract will be awarded to the lowest qualified responsible bidder meeting the required specifications. If the Pricing Pages contain alternates/add-ons, the Contract will be awarded based on the grand total of the base bid and any alternates/add-ons selected.

6. **SELECTION OF ALTERNATES:** Pursuant to W. Va. Code § 5-22-1(f), any solicitation of bids shall include no more than five alternates. Alternates, if accepted, shall be accepted in the order in which they are listed on the bid form. Any unaccepted alternate contained within a bid shall expire 90 days after the date of the opening of bids for review. Determination of the lowest qualified responsible bidder shall be based on the sum of the base bid and any alternates accepted. Alternate selection will be identified in the Purchase Order.

7. **PROGRESS PAYMENTS:** The Vendor will be paid in the form of periodic progress payments for work completed. Payment requests along with documentation supporting the request will be submitted to and reviewed by the Architect. If approved, the Architect will communicate approval to the Owner and Owner will process payment. The Owner reserves the right to withhold liquidated damages from progress payments. Progress payments will be made no more than monthly.

   Approval and payment of progress payments will be based on Contractor's submission of a payment allocation schedule which allocates the entire contract sum to payment milestones. Architect and Owner will review the payment allocation and may mandate changes that they believe are necessary.

8. **RETAINAGE:** Agency is entitled to withhold Ten percent (10%) from each progress payment made as retainage. Agency will partially release retainage upon certification of substantial completion by the Architect in accordance with this Contract but will continue to retain amounts sufficient to cover activities needed to reach final completion.

9. **PERFORMANCE:** Vendor shall perform the Construction Services in accordance with this document and the Project Plans.

10. **SUBSTANTIAL AND FINAL COMPLETION:** Vendor shall achieve Substantial Completion by Two Hundred and Seventy (270) and Final Completion by Three Hundred (300) calendar days. Failure to meet the deadlines established herein, unless extended by change order authorizing additional time free of liquidated damages, will result in liquidated damages being applied.

11. **LIQUIDATED DAMAGES:** Vendor shall pay Liquidated Damages in the amount of $500.00 per calendar day for every calendar day beyond the date for Substantial Completion of the overall contract, as established by the issuance of the Notice to Proceed.

12. **PROJECT PLANS:** Copies of the project plans can be obtained by contacting the entity identified below.

Contact Craig Miller (304-921-2234 Ext.1) OR at cmiller@millereng.net for Project Plans.

Miller Engineering, Inc.
991 River Road
Morgantown, WV 26501

Costs:

$325 each for sets of printed/bound documents shipped by UPS.
$50 each in digital/CD version shipped by USPS.
(Any priority shipping will have to be arranged above costs listed)

Copies of project plans can be examined at the following locations

Kanawha Valley Builders Association
1627 Bigley Avenue
Charleston, WV 25302
Phone: 304-342-7141
Fax: 304-343-8014
Email: kvba@kvba.com

Contractors Association of West Virginia
2114 Kanawha Boulevard East
Charleston, WV 25311
Phone: 304-342-1166
Fax: 340-342-1074
Email: cawv@cawv.org

Construction Employers Association NCWV
2794 White Hall Blvd
White Hall, WV 26554
Phone: 304-367-1290
Fax: 304-367-0126
Email: ceaplanroom@ceawv.com

Parkersburg Marietta Contractors Association
2905 Emerson Avenue
Parkersburg, WV 26104
Phone: 304-485-6485
Fax: 304-428-7622
Email: pmcadesk@gmail.com

Reed Construction Data
30 Technology Parkway South
Suite 100
Norcross, GA 30092
Phone: 800-364-2059
Fax: 800-317-0870
Email: projectinquiries@isqft.com

Pennsylvania Builders Exchange
1813 N. Franklin Street
Pittsburgh, PA 15233
Phone: 412-922-4200
Fax: 412-928-9406
Email: karen@pbe.org

Dodge Data and Analytics
4300 Beltway Place, Suite 180
Arlington, TX 76018-5253
Phone: 800-393-6343
Email: support@construction.com

Ohio Valley Construction Employer's Council
21 Armory Drive
Wheeling, WV 26003
Phone: (304)242-0520
Fax: (304)242-7261
Email: ovcec@ovcec.com

13. **SUBSTITUTIONS:** Any substitution requests must be submitted in accordance with the official question and answer period described in the INSTRUCTIONS TO VENDORS SUBMITTING BIDS, Paragraph 4. Vendor Question Deadline.

14. **FACILITIES ACCESS:** Performance of Contract Services may require access cards and/or keys to gain entrance to Agency's facilities. In the event that access cards and/or keys are required:

14.1. Vendor must identify principal service personnel which will be issued access cards and/or keys to perform service.

14.2. Vendor will be responsible for controlling cards and keys and will pay replacement fee, if the cards or keys become lost or stolen.

14.3. Vendor shall notify Agency immediately of any lost, stolen, or missing card or key.

14.4. Anyone performing under this Contract will be subject to Agency's security protocol and procedures.

14.5. Vendor shall inform all staff of Agency's security protocol and procedures.

15. MISCELLANEOUS:

15.1. Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: _____

Telephone Number: _____

Fax Number: _____

Email Address: _____

15.2. Owner's Representative: Owner's representative for notice purposes is:

Name: Patrick O'Neill

Telephone Number: 304-352-5514

Fax Number: 304-957-1475

Email Address: Patrick.S.ONeill@wv.gov

16. Initial Decision Maker: Miller Engineering, the Engineer, shall serve as the Initial Decision Maker in matters relating to this contract.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Building 25 HVAC Renovations				2325400.00

Comm Code	Manufacturer	Specification	Model #
72151201			

Commodity Line Comments:

Extended Description:

Building 25 HVAC Renovations

SOLICITATION NUMBER: CRFQ GSD2300000020
Addendum Number: 1

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

[ ] Modify bid opening date and time

[ ] Modify specifications of product or service being sought

[ ] Attachment of vendor questions and responses

[✓] Attachment of pre-bid sign-in sheet

[ ] Correction of error

[✓] Other

Description of Modification to Solicitation:

1. To attach pre-bid sign in sheet.
2. To attach larifications from Miller Engineering, Inc.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.

2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

ATTACHMENT A

Pre-Bid Sign-In Sheet

Solicitation Number: CRFQ GSD2300000020
Date of Pre-Bid Meeting: November 15, 2022
Location of Prebid Meeting: Bldg 25 - Parkersburg (Building 25 HVAC Renovations)

Please Note:
Vendors must sign-in on this sheet to verify attendance at the Pre-Bid meeting.
Failure to legibly sign in may be grounds for declaring a vendor ineligible to bid.
For further verification, please also provide a business card if possible.

Firm Represented:*	Rep Name (Printed):	Firm Address:	Telephone #:	Fax #:	Email:
Carrier	Tim Ball	PO Box 15 Scott Depot WV 25560	304-932 1937		tim.ball@carrier.com
Dougherty Co.	Eric Smith	600 50th Street Charleston WV 25304	304-925-6664	304-925-4280	ericsmith@dougherty[illegible] dougherty co. com
Trane	John Williams	10384 Wallace Hollow St Kingsport TN 37642	423-794-6334		JWilliams4@Trane.com
Darnold Mechanical	Brendon Leaptrot	75 Highland LN Kenna, WV	304-988 9001		Bleaptrot @Darnoldmech.com
CPH	Steve Jenkins	CPH INC 1500 Morgantown Industrial Park Morgantown	304-296-7135		Jay@cphwv.com

***One Vendor Per Representative** - No one individual is permitted to represent more than one vendor at the pre-bid meeting. Any individual that does attempt to represent two or more vendors will be required to select one vendor to which the individual's attendance will be attributed. The vendors not selected will be deemed to have not attended the pre-bid meeting unless another individual attended on their behalf.*

MILLER

ADDENDUM #1

Project Name: WV GSD Building 25 HVAC Modifications Rebid
Date: 11/17/2022
Addendum #: 1

Notes:

1. The prebid meeting was held as scheduled. Procurement requirements were reviewed by Cody Taylor. Technical Requirements were reviewed by Craig Miller. Vendors were reminded of the Narrative Summary Scope of Work following section 11 000 Summary of the project manual and that it acts as a guide to the project and is a good place to start. All subs should be given the entire docs set, including this section. Coordination of trades was discussed as a project requirement.
2. This is a rebid, so ensure the rebid documents are used in the preparation of the bid, dated 30Sep22. They are available from MEI for a fee and were sent to the plan rooms listed in the RFQ.
3. Miller reiterated the project blackout requirement for Owner and design team. All questions go through the Buyer at Purchasing to be answered by addendum. Miller and Casdorph expressed the importance of asking questions during bidding. Please ask questions early to the greatest extent possible.
4. Background checks are required for Vendor and all subs on site personnel. If personnel have a current background check, it may be used for the project but must be kept current.

Clarifications:

1. The MAU curb is a new custom structural curb, it is not a standard curb and includes integral work platforms, steps, lighting, etc..., refers to details in the drawings.

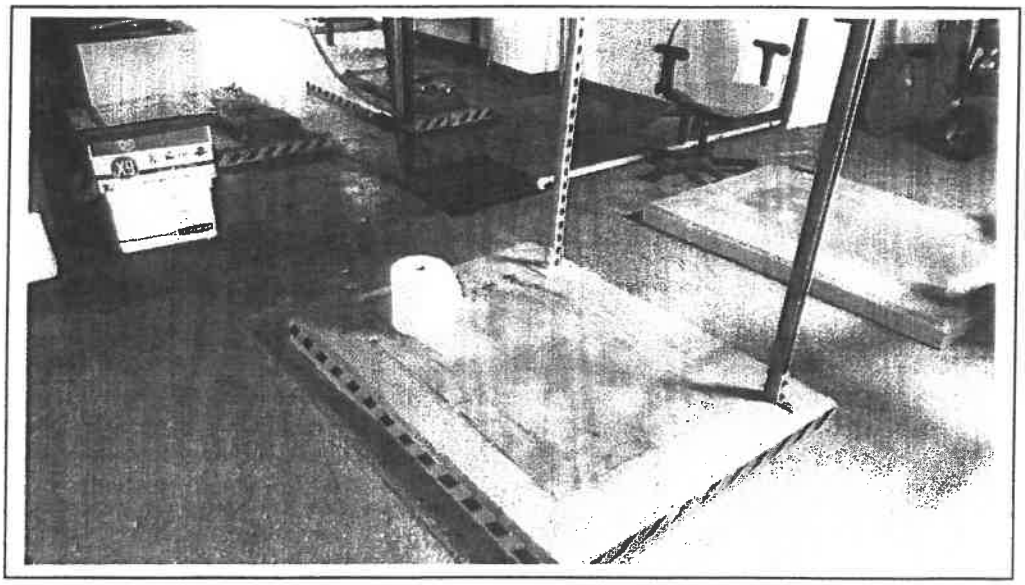
2. The water source heat pumps must utilize hot gas bypass reheat for dehumidification. Electric reheat will not be considered.

3. As the new BAS must run parallel to the old, new control cabinets will be installed beside the existing, which may remain for use as a junction compartment with terminal strips used for splicing and extending all conductor. Conductors, and terminal strips will be neatly labeled end to end and strip to strip in such.

4. ACM is limited to sealed areas, and possibly 9 x 9 tile and mastic as discussed in the project documents. Any suspect material will be reported.

5. The roof work requires the existing warranty to be maintained, by inspection and sign-off and a bond is required for the roofing work.

6. There are four existing equipment curbs in the 1st floor mechanical room which will demolished. The floor will be ground smoothed/ skim coated, and the entire room floor will be prepped and repainted with a single coat two part "garage" epoxy (50 – 60 mil) with a two color flake broadcast, similar to existing. Prep any new work to ensure adhesion. See photo below.



Requests for Substitution:

1. No requests for substitutions have been received.

Administrative:

1. Refer to the RFQ and Addenda for questions related to bid dates and times

All herein becomes part of the scope project documents and the scope of project work. Contractor is to acknowledge this as Addendum #1 on the Bid Form.

Respectfully submitted this 17th day of November, 2022

Craig Miller PE
President
Miller Engineering, Inc.

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Construction

Proc Folder: 1122181	**Reason for Modification:**
Doc Description: Building 25 HVAC Renovations - Rebid	Addendum 2 - to extend question period deadline and bid opening.
Proc Type: Central Purchase Order	

Date Issued	Solicitation Closes	Solicitation No	Version
2022-11-18	2022-12-13 13:30	CRFQ 0211 GSD2300000020	3

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code:

Vendor Name :

Address :

Street :

City :

State : **Country :** **Zip :**

Principal Contact :

Vendor Contact Phone: **Extension:**

FOR INFORMATION CONTACT THE BUYER
Melissa Pettrey
(304) 558-0094
melissa.k.pettrey@wv.gov

Vendor Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

SOLICITATION NUMBER: GSD2300000020
Addendum Number: 2

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

[X] Modify bid opening date and time

[ ] Modify specifications of product or service being sought

[ ] Attachment of vendor questions and responses

[ ] Attachment of pre-bid sign-in sheet

[ ] Correction of error

[X] Other

Description of Modification to Solicitation:

1. **To extend the question deadline from 11/22/2022 to 12/06/2022. Time remains at 12:00 pm. Please refer to Section 4 in the CRFQ documentation (Instructions to Vendor Submitting Bids) for information about submitting questions.**

2. **To move the bid opening date from 12/06/2022 to 12/13/2022. The bid opening time remains at 1:30 pm.**

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.

2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Construction

Proc Folder: 1122181	**Reason for Modification:**
Doc Description: Building 25 HVAC Renovations - Rebid	Addendum No. 3
Proc Type: Central Purchase Order	

Date Issued	Solicitation Closes	Solicitation No	Version
2022-12-09	2022-12-13 13:30	CRFQ 0211 GSD2300000020	4

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code:

Vendor Name :

Address :

Street :

City :

State : **Country :** **Zip :**

Principal Contact :

Vendor Contact Phone: **Extension:**

FOR INFORMATION CONTACT THE BUYER
Melissa Pettrey
(304) 558-0094
melissa.k.pettrey@wv.gov

Vendor Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

SOLICITATION NUMBER: GSD2300000020
Addendum Number: 3

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

[ ] Modify bid opening date and time

[ ] Modify specifications of product or service being sought

[X] Attachment of vendor questions and responses

[ ] Attachment of pre-bid sign-in sheet

[ ] Correction of error

[ ] Other

Description of Modification to Solicitation:

1. **To publish Vendor questions and Agency responses.**

No other changes.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.

2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

CRFQ GSD2300000020
Vendor questions and responses.

Q1. Will the selected mechanical contractor and approved equipment provider be responsible for the following items?

- Providing, installing, programming factory zone Temperature, Humidity, Co2 sensors
- Configuring communications settings of BACnet boards, addressing of each unit, baud rates etc.- If proprietary software if required
- Providing, installing, outside air dampers and actuators. Programming of factory boards to control outside air dampers based on the BAS Co2 setpoint

A1. This question is not clear. The Vendor will provide labor and materials to meet the requirements of the project and the sequence of operation, including all hardware and programming of equipment and startup, to achieve a fully operational system. The reference to "factory boards" is dependent on the capability and function of the installed board, but the requirement to monitor and control by the BAS, either directly or through an equipment mounted factory or a BAS manufacturer's field mounted unitary controller remains, regardless of the method utilized, to achieve the performance requirements. Review the control and equipment scope and requirements prior to bidding.

Q2. Can the new WSHPs run stand-alone with the zone sensor until a predetermined amount of units have been changed out? If the BAS programming could be done in groups of 5 or 10 units it would save the customer money.

A2. Provided the area(s) involved can remain under reasonable control, groups of 5-7 units could be done in such a manner. However, groups of units will not be permitted to lag or "stack up" and be pushed late into the project. Should this occur, the Owner reserves the right to suspend WSHP replacements until the lag is resolved. Such a suspension will not entitle the Vendor to additional time or cost to complete the project.

Q3. Can we have a requirement added that the approved HVAC equipment manufacture will provide the following:

- The sequence of operation for the Factory installed control boards- The sequences will be added to the controls submittals for approval.
- BACnet integration guide for each version of equipment provided
- At least 2 days of onsite integration support from a Factory provided BAS technician

A3. The referenced requirements will not be added. Vendors must meet or exceed project requirements.

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Construction

Proc Folder: 1122181 **Doc Description:** Building 25 HVAC Renovations - Rebid **Proc Type:** Central Purchase Order			**Reason for Modification:** Addendum No. 4
Date Issued	**Solicitation Closes**	**Solicitation No**	**Version**
2022-12-12	2022-12-20 13:30	CRFQ 0211 GSD2300000020	5

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code:

Vendor Name :

Address :

Street :

City :

State : **Country :** **Zip :**

Principal Contact :

Vendor Contact Phone: **Extension:**

FOR INFORMATION CONTACT THE BUYER
Melissa Pettrey
(304) 558-0094
melissa.k.pettrey@wv.gov

Vendor Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

SOLICITATION NUMBER: CRFQ GSD2300000020
Addendum Number: 4

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

[✓] Modify bid opening date and time

[ ] Modify specifications of product or service being sought

[ ] Attachment of vendor questions and responses

[ ] Attachment of pre-bid sign-in sheet

[ ] Correction of error

[ ] Other

Description of Modification to Solicitation:

Addendum is issued to publish and distribute the following information to the Vendor community.

1. To extend bid opening date to Tuesday December 20, 2022 @ 1:30 pm.

No other changes.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.

2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: CRFQ GSD2300000020

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification. Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:
(Check the box next to each addendum received)

- [x] Addendum No. 1
- [x] Addendum No. 2
- [x] Addendum No. 3
- [x] Addendum No. 4
- [ ] Addendum No. 5
- [ ] Addendum No. 6
- [ ] Addendum No. 7
- [ ] Addendum No. 8
- [ ] Addendum No. 9
- [ ] Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

CP&H Inc.
Company

Authorized Signature

12/20/22
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

WV BUILDING 25 - HVAC RENOVATIONS

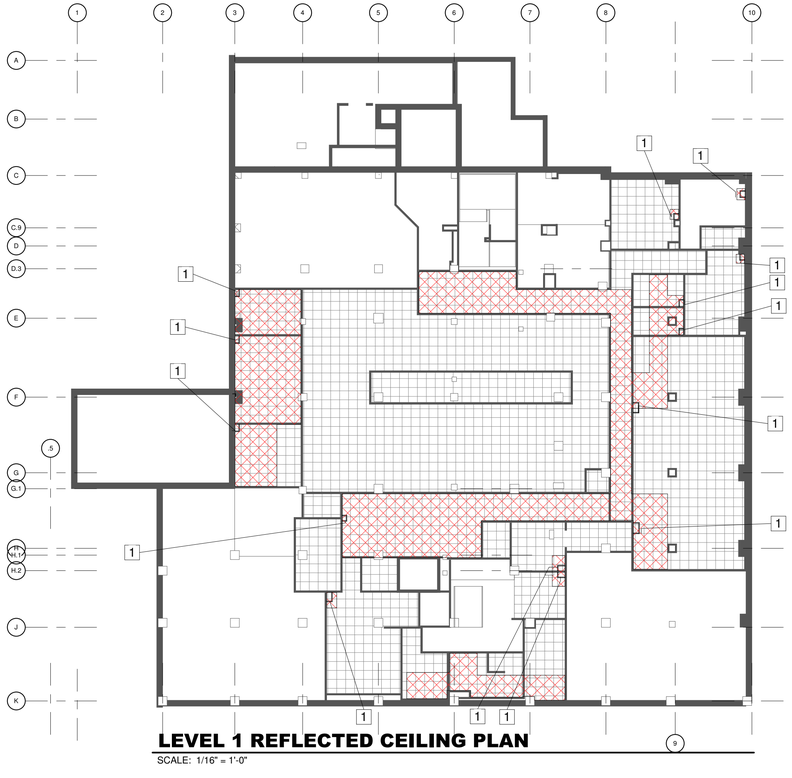
MILLER ENGINEERING, INC.

WEST VIRGINIA OFFICE
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PHONE: (304) 291 - 2234

PENNSYLVANIA OFFICE
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PHONE: (724) 966 - 5655

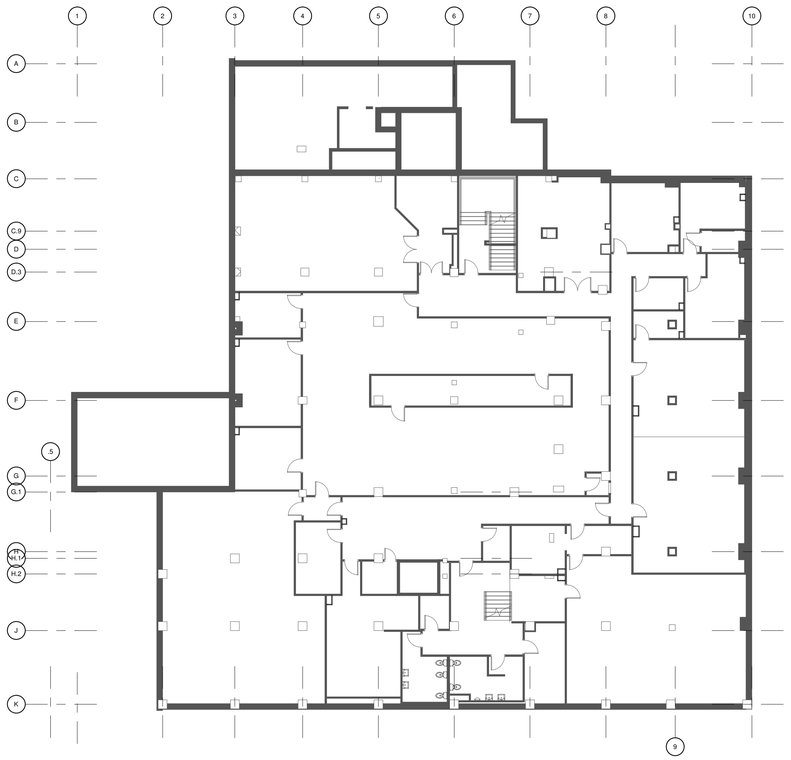
MEI PROJECT # 19013	
DWG	**TITLE**
GENERAL	
G000	COVER PAGE
ARCHITECTURAL	
A031	DEMO 1ST FLOOR REFLECTED CEILING PLAN
A032	DEMO 2ND FLOOR REFLECTED CEILING PLAN
A033	DEMO 3RD FLOOR REFLECTED CEILING PLAN
A034	DEMO 4TH FLOOR REFLECTED CEILING PLAN
A035	DEMO 5TH FLOOR REFLECTED CEILING PLAN
A036	DEMO 6TH FLOOR REFLECTED CEILING PLAN
A301	BUILDING SECTION
MECHANICAL	
M000	MECHANICAL ABBREVIATIONS
M001	DEMO MECHANICAL PLAN
M002	DEMO MECHANICAL PLAN
M003	DEMO MECHANICAL PLAN
M004	DEMO MECHANICAL PLAN
M005	DEMO MECHANICAL PLAN
M006	DEMO MECHANICAL PLAN
M007	DEMO MECHANICAL PLAN
M101	MECHANICAL PLAN
M102	MECHANICAL PLAN
M103	MECHANICAL PLAN
M104	MECHANICAL PLAN
M105	MECHANICAL PLAN

MEI PROJECT # 19013	
DWG	**TITLE**
M106	MECHANICAL PLAN
M107	MECHANICAL PLAN
M108	MECHANICAL PLAN
M401	MECHANICAL ENLARGED PLANS
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M503	MECHANICAL DETAILS
M601	MECHANICAL SCHEDULE
ELECTRICAL	
E000	ELECTRICAL ABBREVIATIONS
E001	DEMO ELECTRICAL PLAN
E002	DEMO ELECTRICAL PLAN
E003	DEMO ELECTRICAL PLAN
E004	DEMO ELECTRICAL PLAN
E005	DEMO ELECTRICAL PLAN
E101	ELECTRICAL PLAN
E102	ELECTRICAL PLAN
E103	ELECTRICAL PLAN
E104	ELECTRICAL PLAN
E105	ELECTRICAL PLAN
E106	ELECTRICAL PLAN
E107	ELECTRICAL PLAN
E601	ELECTRICAL SCHEDULES



LEVEL 1 REFLECTED CEILING PLAN

SCALE: 1/16" = 1'-0"



LEVEL 1 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN GENERALLY MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY TO COMPLETE THE PROJECT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1 INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL. SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.

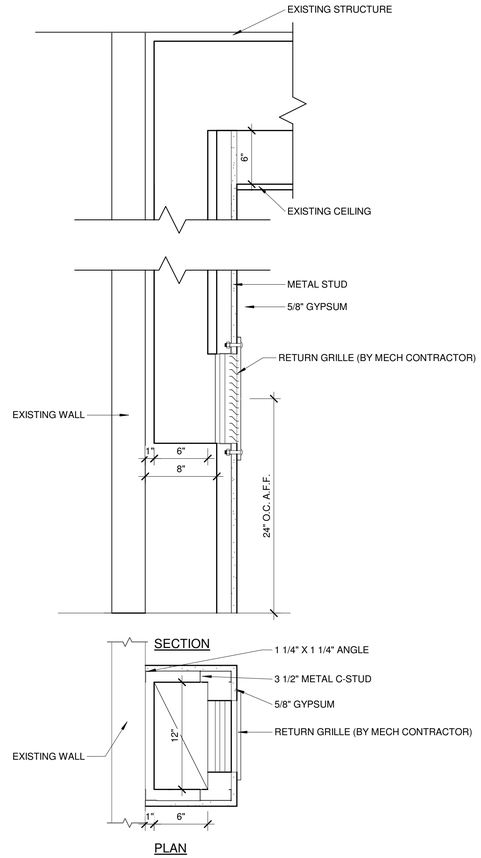
2 COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND

HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

FILTER GRILLE SCHEDULE

RANGE (CFM)	FILTER GRILLE	DUCT SIZE	CHASE (EXTERNAL)
0 - 300	10X10	12"X6"	16"X8"
300 - 600	12X20	14"X10"	18"X12"
600 - 1000	14X24	20"X10"	24"X12"



WALL RETURN GRILLE CHASE DETAIL

SCALE: 1 1/2" = 1'-0"

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. PARKS
4049
REGISTERED ARCHITECT
9-28-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

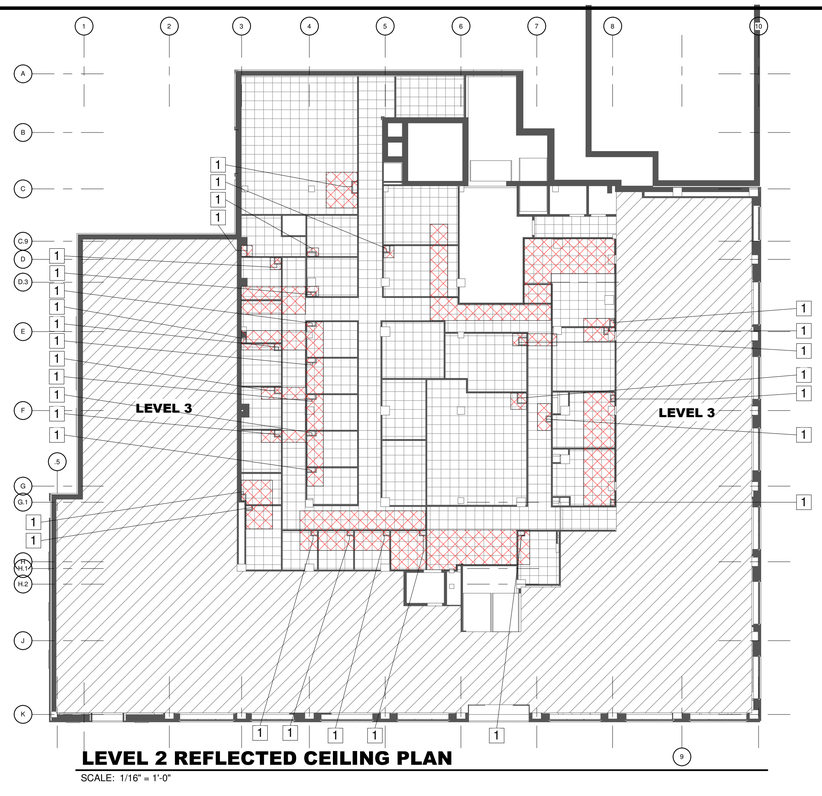
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

SHEET NAME:

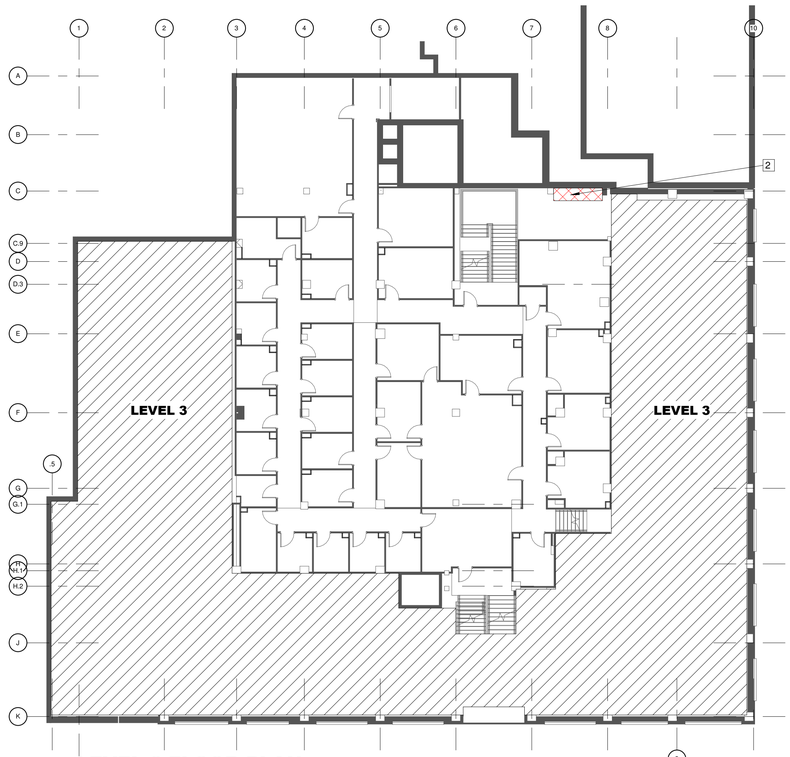
1ST FLOOR PLAN & REFLECTED CEILING PLAN

A031



LEVEL 2 REFLECTED CEILING PLAN

SCALE: 1/16" = 1'-0"



LEVEL 2 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN GENERALLY MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY TO COMPLETE PROJECT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1. INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL. COORDINATE W/ MECHANICAL CONTRACTOR. SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS AND LOCATIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.
2. COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND

HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. PARTS
4049
REGISTERED ARCHITECT
9-30-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

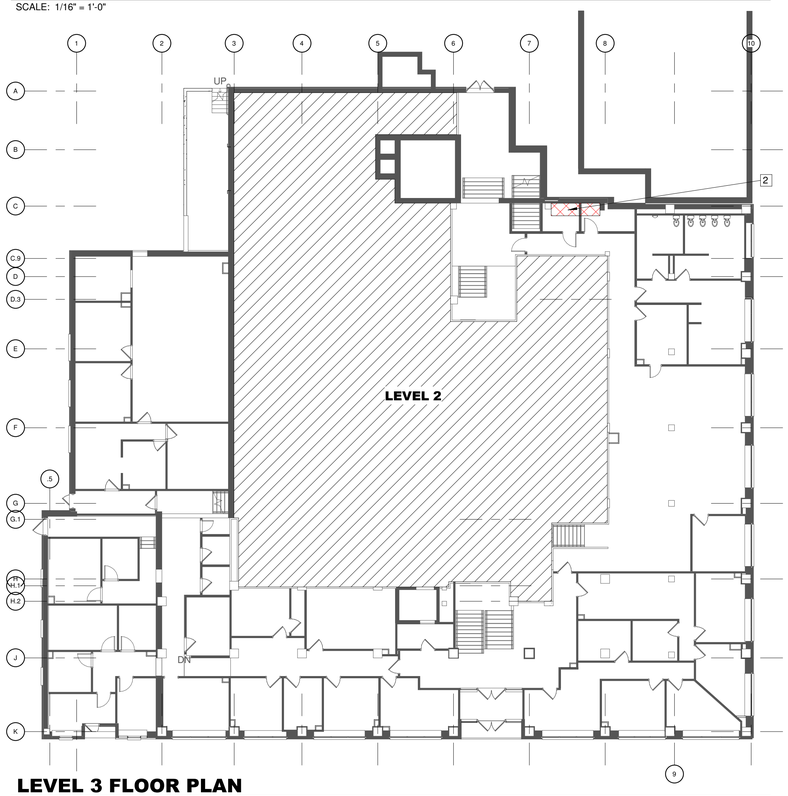
SHEET NAME:

2ND FLOOR PLAN & REFLECTED CEILING PLAN

A032

LEVEL 3 REFLECTED CEILING PLAN

SCALE: 1/16" = 1'-0"



LEVEL 3 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN GENERALLY MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY TO COMPLETE PROJECT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1. INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.
2. COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND	
HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. POWERS
4049
REGISTERED ARCHITECT
9-30-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

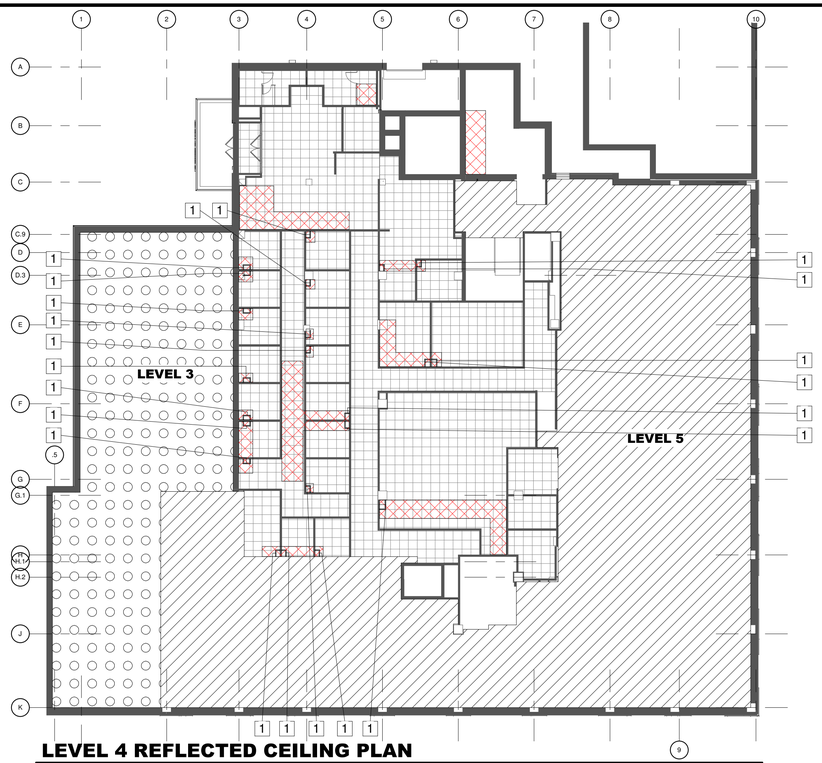
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

SHEET NAME:

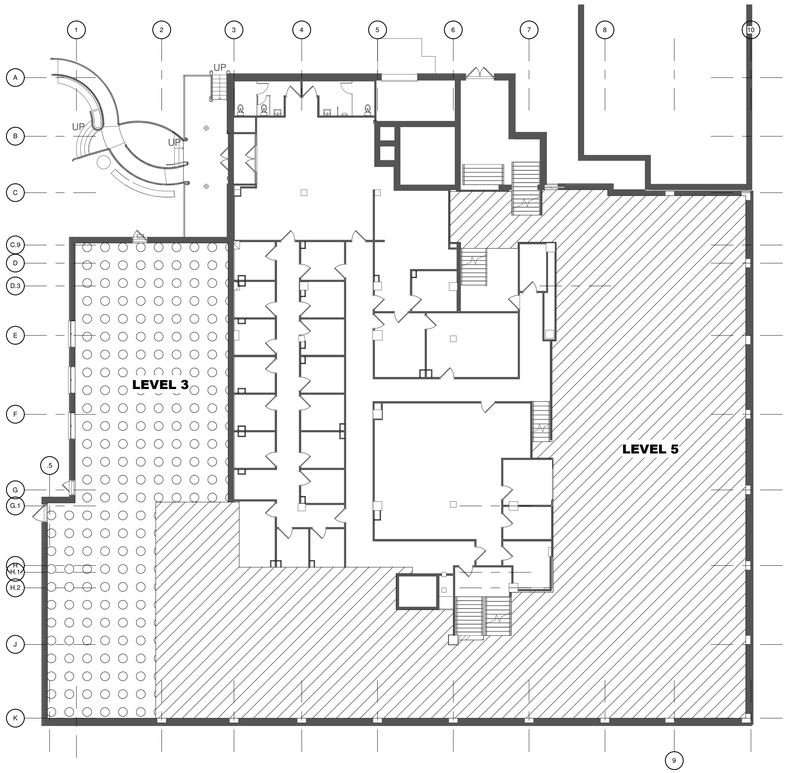
3RD FLOOR PLAN & REFLECTED CEILING PLAN

A033



LEVEL 4 REFLECTED CEILING PLAN

SCALE: 1/16" = 1'-0"



LEVEL 4 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY FOR NEW DUCT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1. INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL. SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.
2. COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND

HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:

Montum Architecture

Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. PARTS
4049
REGISTERED ARCHITECT
9-30-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

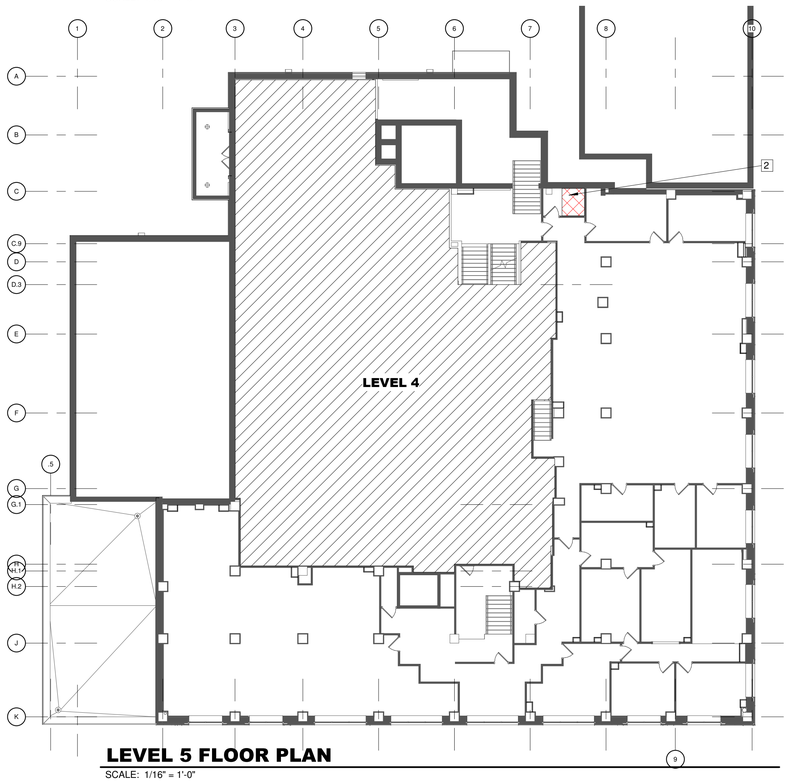
SHEET NAME:

4TH FLOOR PLAN & REFLECTED CEILING PLAN

A034

LEVEL 5 REFLECTED CEILING PLAN

SCALE: 1/16" = 1'-0"



LEVEL 5 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN GENERALLY MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY TO COMPLETE PROJECT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1. INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.
2. COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND

HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. PIFFATS
4049
REGISTERED ARCHITECT
9-16-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

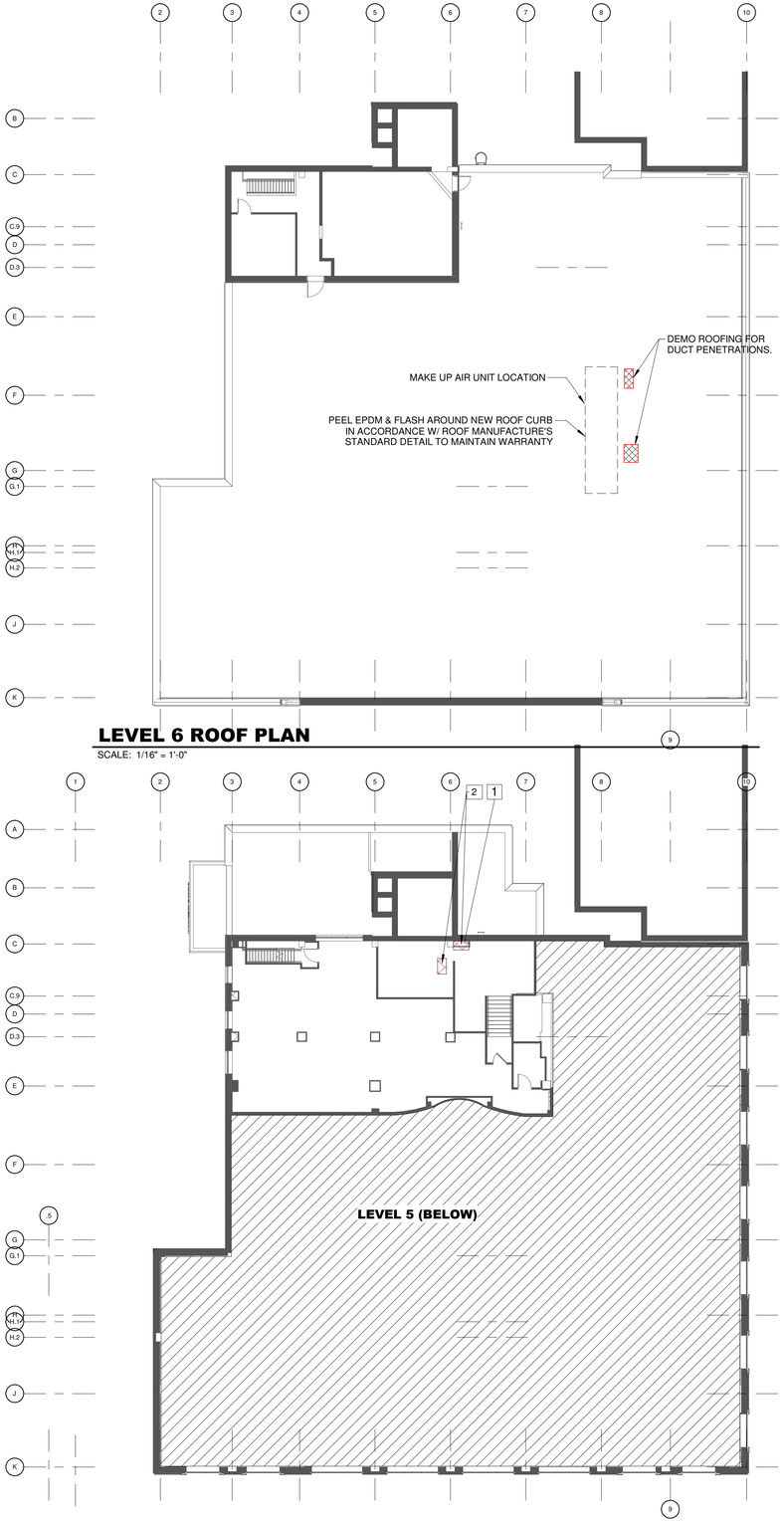
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

SHEET NAME:

5TH FLOOR PLAN & REFLECTED CEILING PLAN

A035



LEVEL 6 ROOF PLAN

SCALE: 1/16" = 1'-0"

LEVEL 6 FLOOR PLAN

SCALE: 1/16" = 1'-0"

DEMO NOTES:

1. TAKE DOWN AND RE-INSTALL CEILING IN GENERALLY MARKED AREAS TO CLOSEST GRID, UNLESS NOTED OTHERWISE.
2. SELECTIVELY TAKE DOWN CEILING AND RE-INSTALL AS NECESSARY TO COMPLETE PROJECT WORK, COORDINATE W/ MECHANICAL BEFORE BIDDING.
3. WHERE CEILING FIXTURES ARE DEMOED AND NOT REPLACED, INSTALL CEILING TILE TO MATCH EXISTING.
4. SECURE & MAKE SAFE ALL CEILING MOUNTED LIGHTING, FIRE ALARM, & TELECOMMUNICATION DEVICES WHERE CEILING TAKE DOWN OR DEMO OCCURS. FIRE ALARM & TELECOMMUNICATION DEVICES MUST REMAIN IN SERVICE. RE-INSTALL REMOVED DEVICES ONCE CEILINGS ARE PUT BACK IN PLACE. COORDINATE W/ OTHER TRADES TO COMPLETE WORK.

KEY NOTES:

1. INSTALL WALL RETURN CHASE FROM 6" ABOVE CEILING TO FLOOR. INSTALL WALL RETURN GRILLE CHASE DETAIL. SEE MECHANICAL SHEETS FOR DUCT SIZING CHASE DIMENSIONS. MODIFY ACOUSTICAL CEILING GRID & WALL TRACK TO CHASE.
2. COORDINATE FLOOR PENETRATION LOCATION AND SIZE PRIOR TO BIDDING.

CEILING DEMO LEGEND

HATCH PATTERN	TITLE
	TAKE DOWN AND REINSTALL CEILING
	REMOVE CEILING

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
STATE OF WEST VIRGINIA
THOMAS F. PARKS
4045
REGISTERED ARCHITECT
9-30-22

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

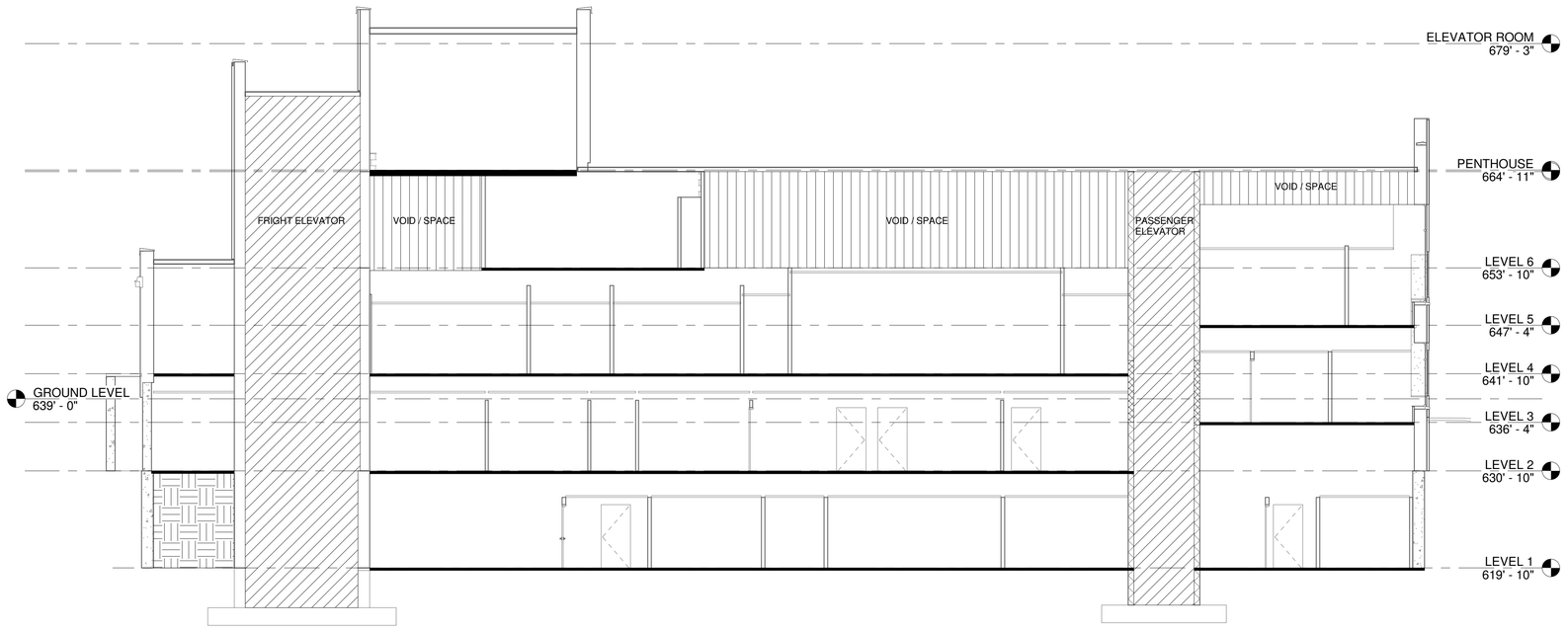
PROJECT STATUS:
CONSTRUCTION DOCUMENT

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JAH
DRAWN BY:	JAH
CHECKED BY:	TFP

SHEET NAME:
6TH FLOOR PLAN & REFLECTED CEILING PLAN

A036



1 A301 BUILDING SECTION

SCALE: 1/8" = 1'-0"

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:

Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

STATE OF WEST VIRGINIA
THOMAS F. PARTS
4049
REGISTERED
ARCHITECT
9-30-22

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENT

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	JMM
DRAWN BY:	JMM
CHECKED BY:	TFP

SHEET NAME:

BUILDING SECTION

A301

MECHANICAL ABBREVIATIONS

SYMBOLS	
#	NUMBER
&	AND
°	DEGREES
°F	DEGREES FAHRENHEIT
A	
AAV	AUTOMATIC AIR VENT
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
APPROX	APPROXIMATELY
AUX	AUXILIARY
AVG	AVERAGE
B	
BFV	BUTTERFLY VALVE
BH	BASEBOARD HEATER
BHP	BRAKE HORESPOWER
BLR	BOILER
BTUH	BRITISH THERMAL UNIT PER HOUR
BV	BALL VALVE
C	
CA	COMPRESSED AIR
CAP	CAPACITY
CFM	CUBIC FEET PER MINUTE
CHKV	CHECK VALVE
CIRC	CIRCULATING
CI	CAST IRON
CKT	CIRCUIT
CMU	CONCRETE MASONARY UNIT
C/O	CLEAN OUT
CON	CONDENSATE
CONT	CONTINUATION
CT	COOLING TOWER
CU	CONDENSING UNIT
D	
DIA	DIAMETER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
E	
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE(°F)
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EFF	EFFICIENCY
ELEC	ELECTRIC
ELEV	ELEVATION
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
EXH	EXHAUST
EXIST	EXISTING
EWT	ENTERING WATER TEMPERATUR(°F)
F	
°F	FAHRENHEIT
FCU	FAN COIL UNIT
FD	FIRE DAMPER/FLOOR DRAIN
FLA	FULL LOAD AMPS
FLR	FLOOR
FO	FLAT OVAL
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FEET
G	
GAS	NATURAL GAS
GALV	GALVANIZED
GA	GAUGE
GC	GENERAL CONTRACTOR
GLV	GLOBE VALVE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GATE VALVE
H	
HCWL	HYDRONIC CHILLED WATER LOOP
HCWR	HYDRONIC CHILLED WATER RETURN
HCWS	HYDRONIC CHILLED WATER SUPPLY
HHWL	HYDRONIC HOT WATER LOOP
HHWR	HYDRONIC HOT WATER RETURN
HHWS	HYDRONIC HOT WATER SUPPLY
HORIZ	HORIZONTAL
HP	HORSEPOWER/HEAT PUMP
HR	HOUR
HTG	HEATING
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
HZ	HERTZ
I	
ID	INSIDE DIAMETER
IN	INCHES
INV	INVERT
J	
JB	JUNCTION BOX
K	
KW	KILOWATT
KWH	KILOWATT HOUR
L	
LAT	LEAVING AIR TEMPERATURE(°F)
LBS	POUNDS
LBS/HR	POUNDS PER HOUR
LF	LINEAR FEET
LP	LIQUID PROPANE
LV	LOUVER
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE(°F)
M	
MAU	MAKE-UP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIUM
MBH	THOUSAND BTUH
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MFG	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MS	MINI-SPLIT SYSTEM
N	
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED; NOISE CRITERIA
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NFC	NATIONAL FIRE CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NO	NORMALLY OPEN
NTS	NOT TO SCALE
O	
OA	OUTSIDE AIR
OC	ON CENTER
OCC	OCCUPANCY
OD	OUTSIDE DIAMETER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OSV	OIL SAFETY VALVE
OZ	OUNCE
P	
P	PUMP
PC	PLUMBING CONTRACTOR
PNL	PANEL
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE
PTAC	PACKAGED TERMINAL AIR CONDITIONER
Q	
QTY	QUANTITY
R	
RA	RETURN AIR
RAD	RADIATOR
RCP	RADIANT CEILING PANEL
REFRIG	REFRIGERANT
REQD	REQUIRED
REV	REVISION
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
RV	RELIEF VALVE
S	
SA	SUPPLY AIR
SCH	SCHEDULE
SD	SMOKE DAMPER
SENS	SENSIBLE
SP	STATIC PRESSURE (INCHES OF WATER)
SPEC	SPECIFICATION
SQ	SQUARE
SQFT	SQUARE FOOT
SS	STAINLESS STEEL
STD	STANDARD
STRUCT	STRUCTURAL
T	
T	THERMOSTATE
TA	TRANSFER AIR
TCV	TEMPERATURE CONTROL VALVE
TDV	TRIPLE DUTY VALVE
TEMP	TEMPERATURE
TOT	TOTAL
TRANS	TRANSITION
TSTAT	THERMOSTAT
TV	TURNING VANES
TYP	TYPICAL
U	
UH	UNIT HEATER
UV	UNIT VENTILATOR
V	
VOLTS	VOLTAGE
VA	VOLT AMPERES
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VEL	VELOCITY
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VOLTS	VOLTAGE
VRF	VARIABLE REFRIGERANT FLOW
VVT	VARIABLE VOLUME AND TEMPERATURE
W	
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
WT	WEIGHT
Z	
Z	ZONE
ZCV	ZONE CONTROL VALVE

HVAC BASIS OF DESIGN

A. SPACE SET POINTS:
   1. GENERAL SPACES SETPOINTS
      a. COOLING: 72°F, 55% RH
      b. HEATING: 70°F
B. OUTSIDE AIR CONDITIONS
   1. SUMMER: 91°F WB, 74°F DB
   2. WINTER: 4°F DB, 2.1°F WB
C. BUILDING ENVELOPE
   1. WALLS: R-4
   2. ROOF: R-9
   3. WINDOWS: 0.343 U-VALUE
   4. DOORS: 0.60 U-VALUE W/ 0.3 U-VALUE GLASS

DUCTWORK SHAPE LEGEND

ANNOTATION STYLE	DUCTWORK SHAPE
24" x 12"	RECTANGULAR
24" ø	ROUND
24" / 12"	FLAT OVAL

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

PIPING NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE PIPING SYSTEMS AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. NATURAL GAS PIPING IS TO BE P40 STEEL w/ BLACK IRON FITTINGS. PROVIDE WELDED GAS PIPING BY SIZE AS REQUIRED BY FUEL GAS CODE.
3. PROVIDE BALL VALVE STOPS AT ALL FIXTURES. PROVIDE UNIONS, DIRT LEGS, AND REGULATORS ON ALL EQUIPMENT.
4. COORDINATE ALL STUB-UPS AND FIELD ADJUST LOCATIONS FOR COORDINATION AS NECESSARY. AVOID EXCESSIVE ADDITIONAL PIPE FITTINGS.
5. PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP IN THE HEATING WATER, CHILLED WATER, AND OTHER CLOSED WATER PIPING SYSTEMS. ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT BOTTOM OF RISERS AND LOW POINTS.
6. UNLESS OTHERWISE NOTED, ALL PIPING IS TO OVERHEAD, TIGHT TO UNDERSIDE OF STRUCTURE OR DECK w/ SPACE FOR INSULATION.
7. INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, ETC. ARE ACCESSIBLE.
8. ALL BALANCING VALVES SHALL BE PROVIDED w/ POSITION INDICATORS AND MANUAL ADJUSTABLE STOPS.
9. ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
10. UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES, AND IN LONG PIPING RUNS O PERMIT DISASSEMBLY FOR ALTERATIONS AND REPAIRS.
11. ALL PIPING SHALL CLEAR DOORS AND WINDOWS. ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
12. ALL PIPING WORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
13. PROVIDED FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS, CHILLERS, COOLING TOWERS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COILS.
14. ALL WORK TO MEET REQUIREMENTS OF CURRENT INTERNATIONAL PLUMBING CODE, INTERNATIONAL MECHANICAL CODE, APPLICABLE LOCAL CODES, LOCAL UTILITY REQUIREMENTS, AND THE INTERNATIONAL FUEL GAS CODE.
15. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ECT. IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
16. INSULATE ALL CONDENSATE PIPING.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

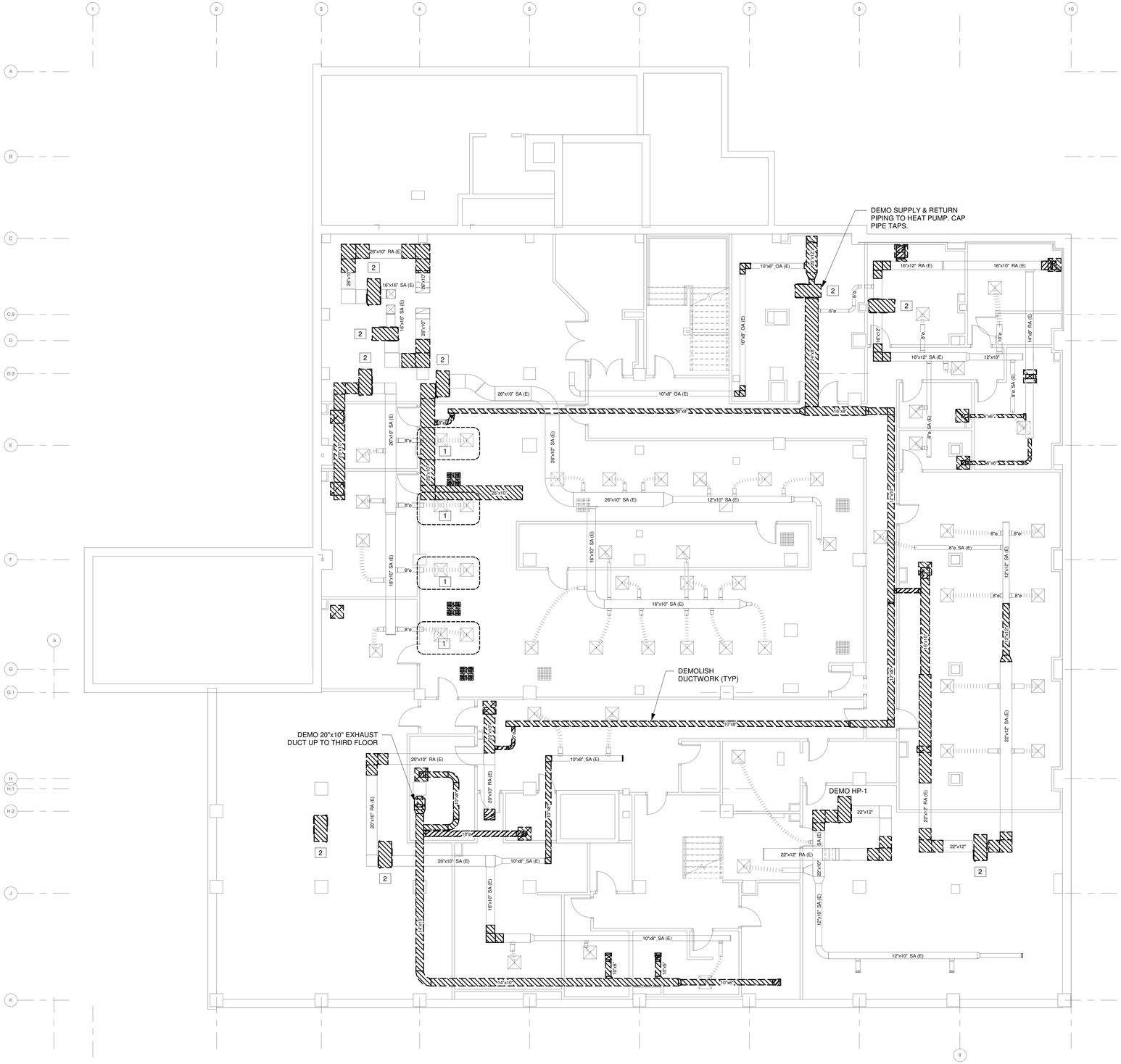
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL ABBREVIATIONS

M000



LEVEL 1 MECHANICAL DEMO PLAN

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

SHEET NOTES

1. SHORTEN FLEX DUCT AS NECESSARY TO ACCOMMODATE NEW DIFFUSER LOCATION.
2. DEMO EXISTING HEAT PUMP.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

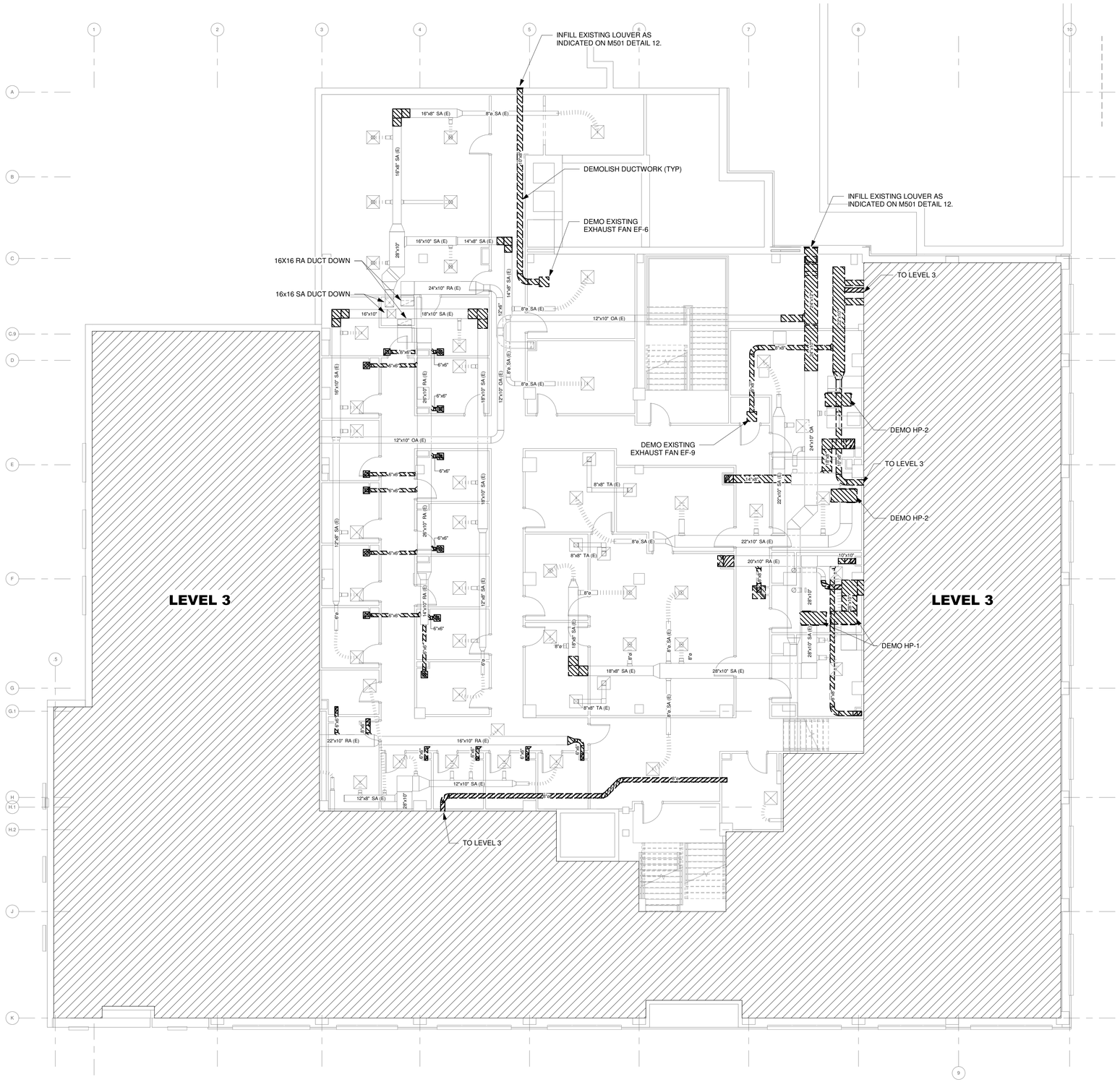
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M001



LEVEL 2 MECHANICAL DEMO PLAN

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARNEGIE, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

BRIAN C. MILLER REGISTERED 15184 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

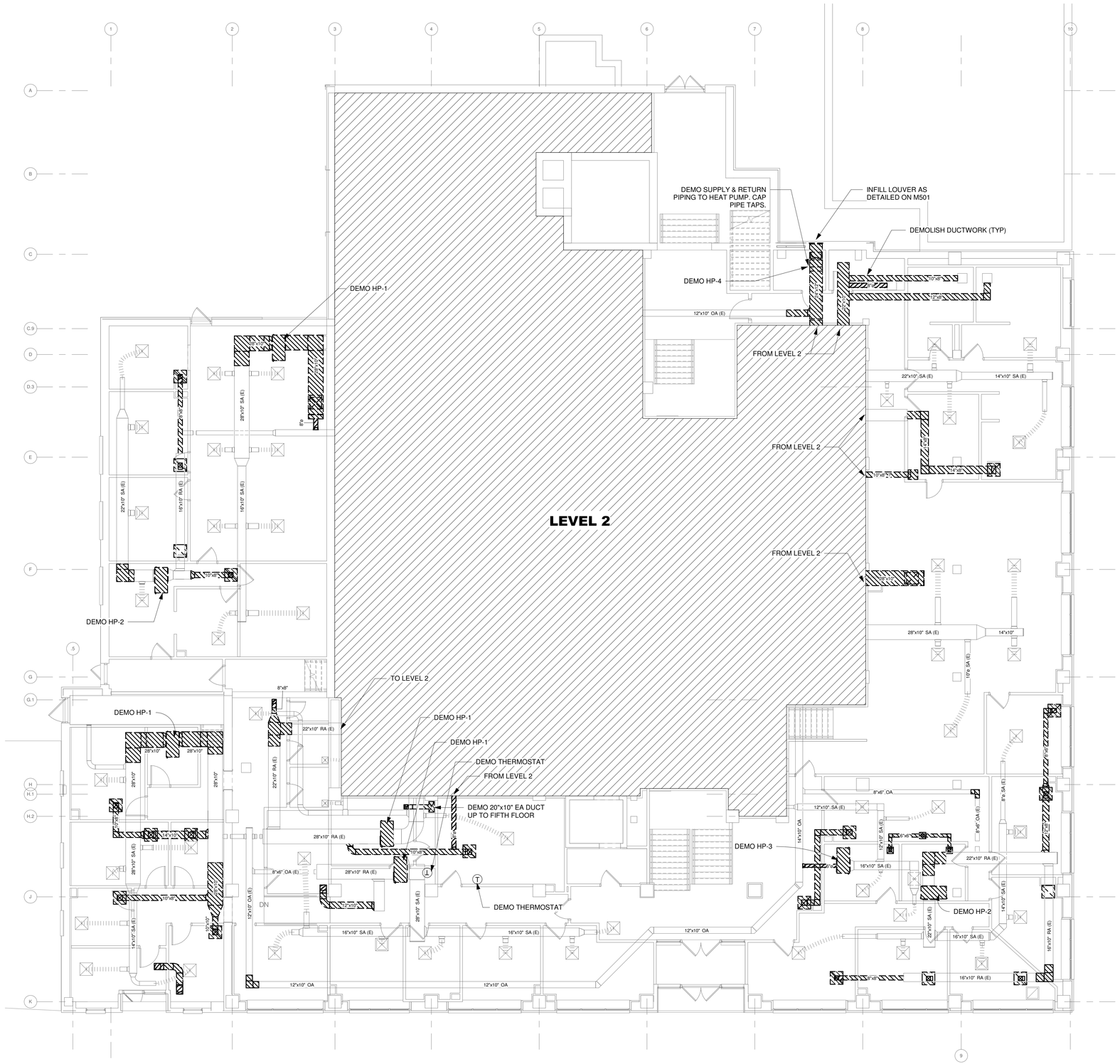
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M002



LEVEL 2 MECHANICAL DEMO PLAN

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARNEGIE, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

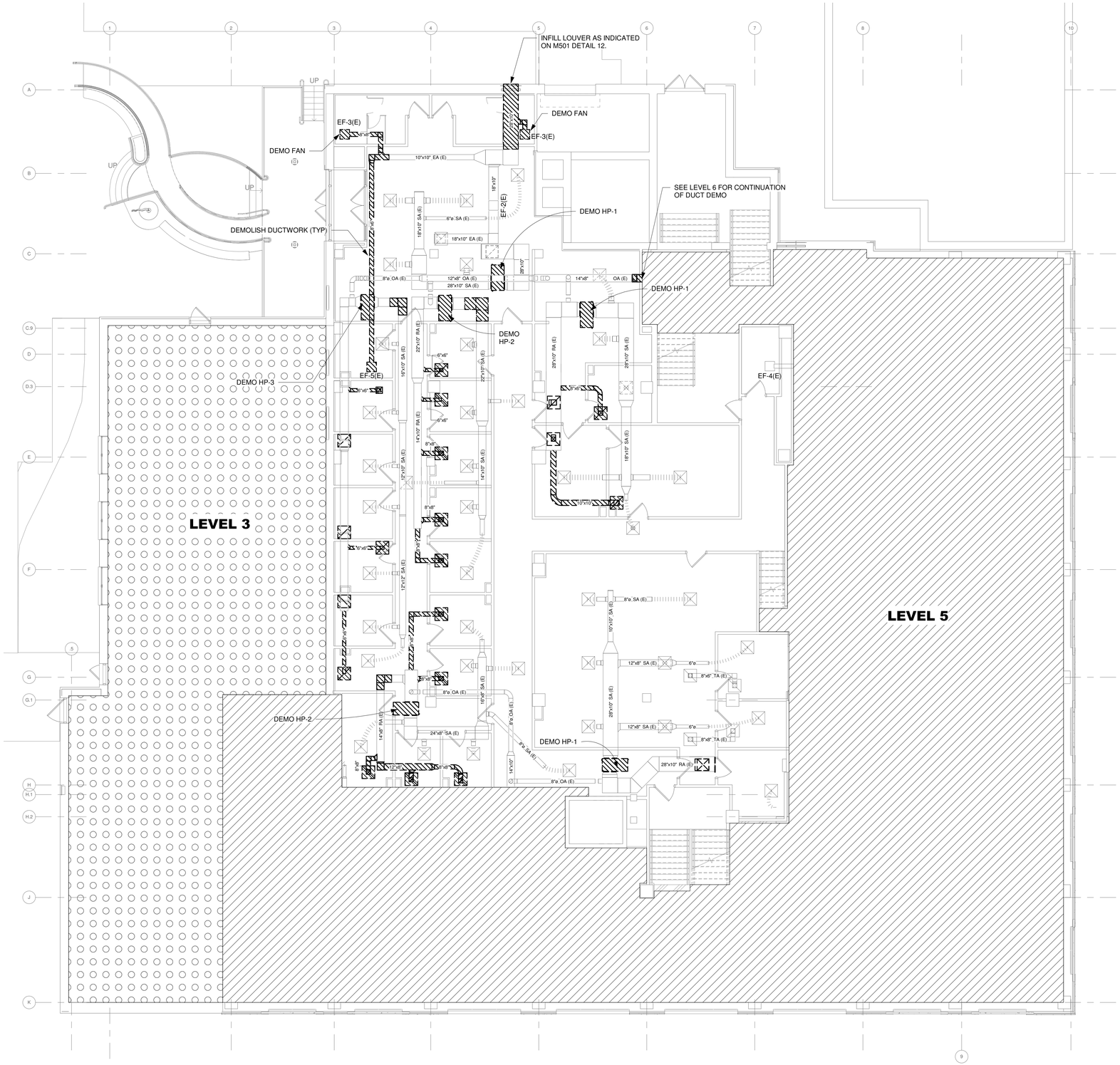
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M003



LEVEL 4 MECHANICAL DEMO PLAN

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARNEGIE, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

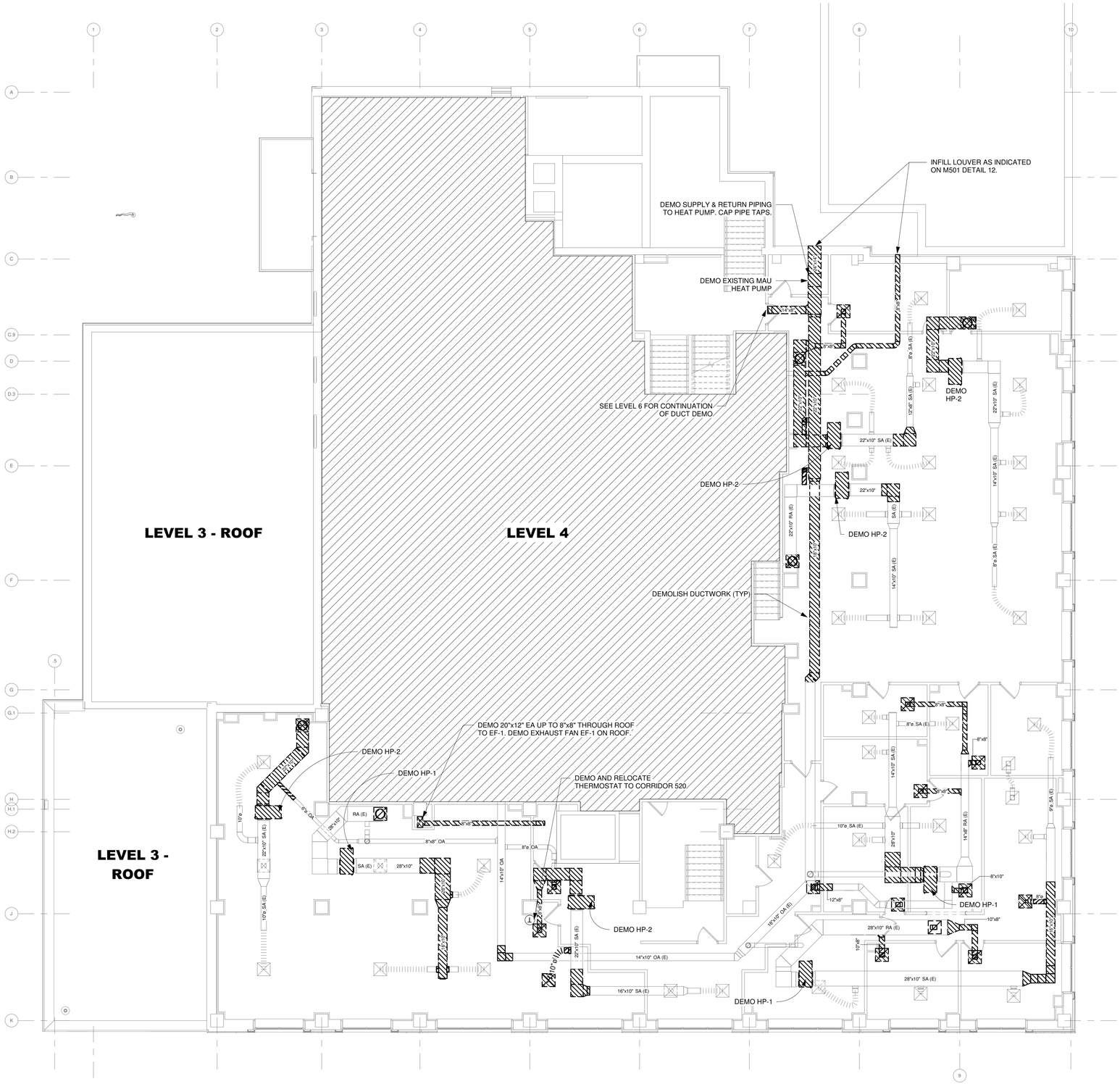
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M004



DEMOLITION FIFTH FLOOR MECHANICAL

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

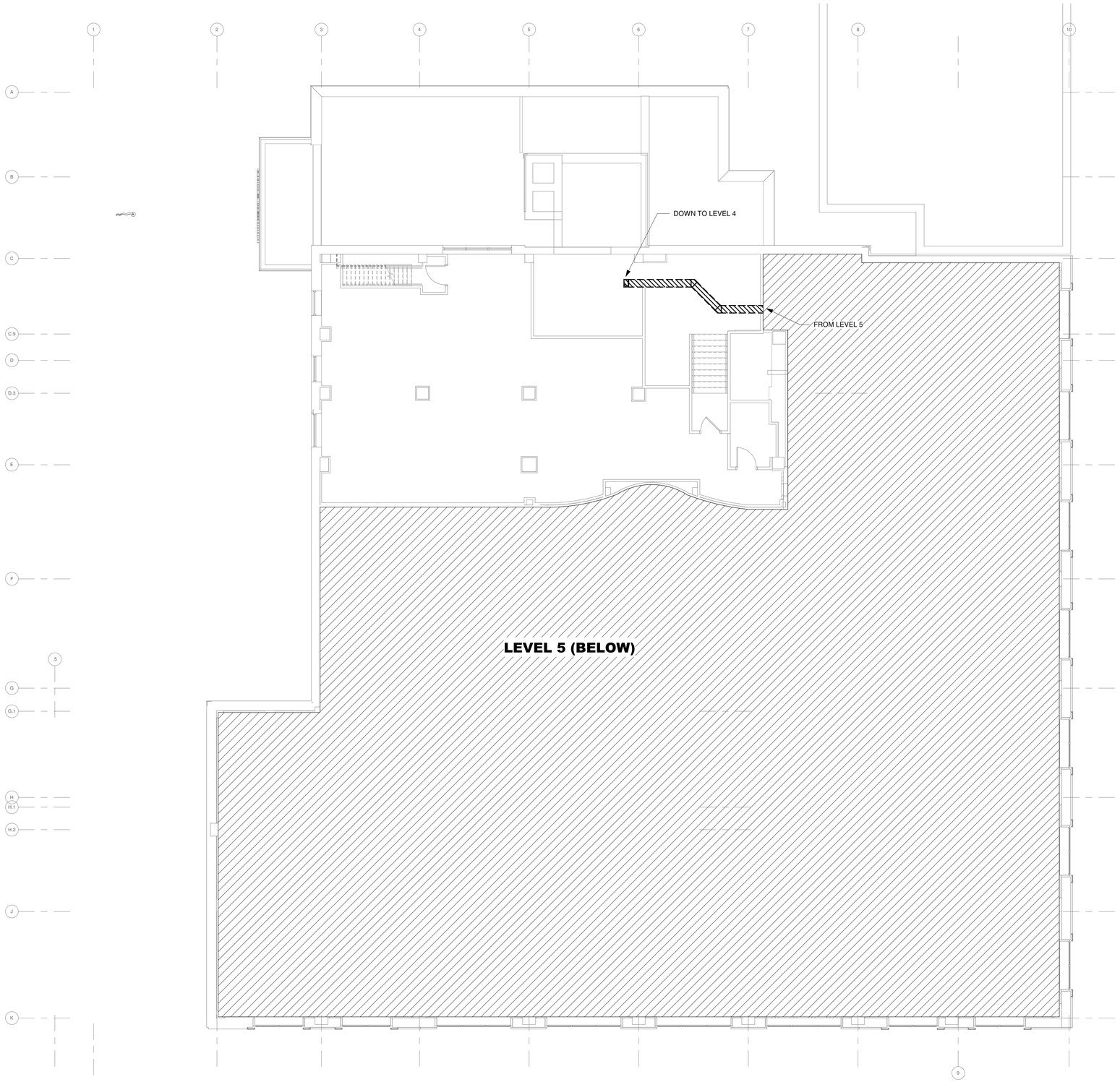
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M005



DEMOLITION SIXTH FLOOR MECHANICAL

1/8" = 1'-0"

MECHANICAL DEMO NOTES

1. DEMOLISH HATCHED DUCTWORK AND HEAT PUMPS AS INDICATED.
2. DISCONNECT HYDRONIC PIPING SUPPLY AND RETURN LINES TO HPs AS PART OF DEMO. VALVE OFF LINES FOR RECONNECTION TO NEW HEAT PUMPS.
3. SECURE ALL EXISTING DUCTWORK AND PIPING TO REMAIN AS NECESSARY. PROTECT DUCT, DIFFUSERS AND GRILLES TO REMAIN FROM DUST INFILTRATION DURING CONSTRUCTION.
4. COORDINATE EXTENT OF CEILING TAKE DOWN w/ OTHER TRADES.
5. PRIOR TO TAKING ANY MECHANICAL SYSTEMS OUT OF SERVICE, COORDINATE w/ OWNER FOR SCHEDULING AND RELOCATION OF OCCUPANTS AND EQUIPMENTS.
6. PROVIDE GLYCOL ON SITE. ENSURE SYSTEM REMAINS A ADEQUATELY FILLED DURING CONSTRUCTION ACTIVITIES AND TOP OFF AT PROJECT COMPLETION. DO NOT USE OWNER'S FLOOR STOCK OF GLYCOL.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M006

DEMOLITION PENTHOUSE & ROOF MECHANICAL

1/8" = 1'-0"

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER
ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:

Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

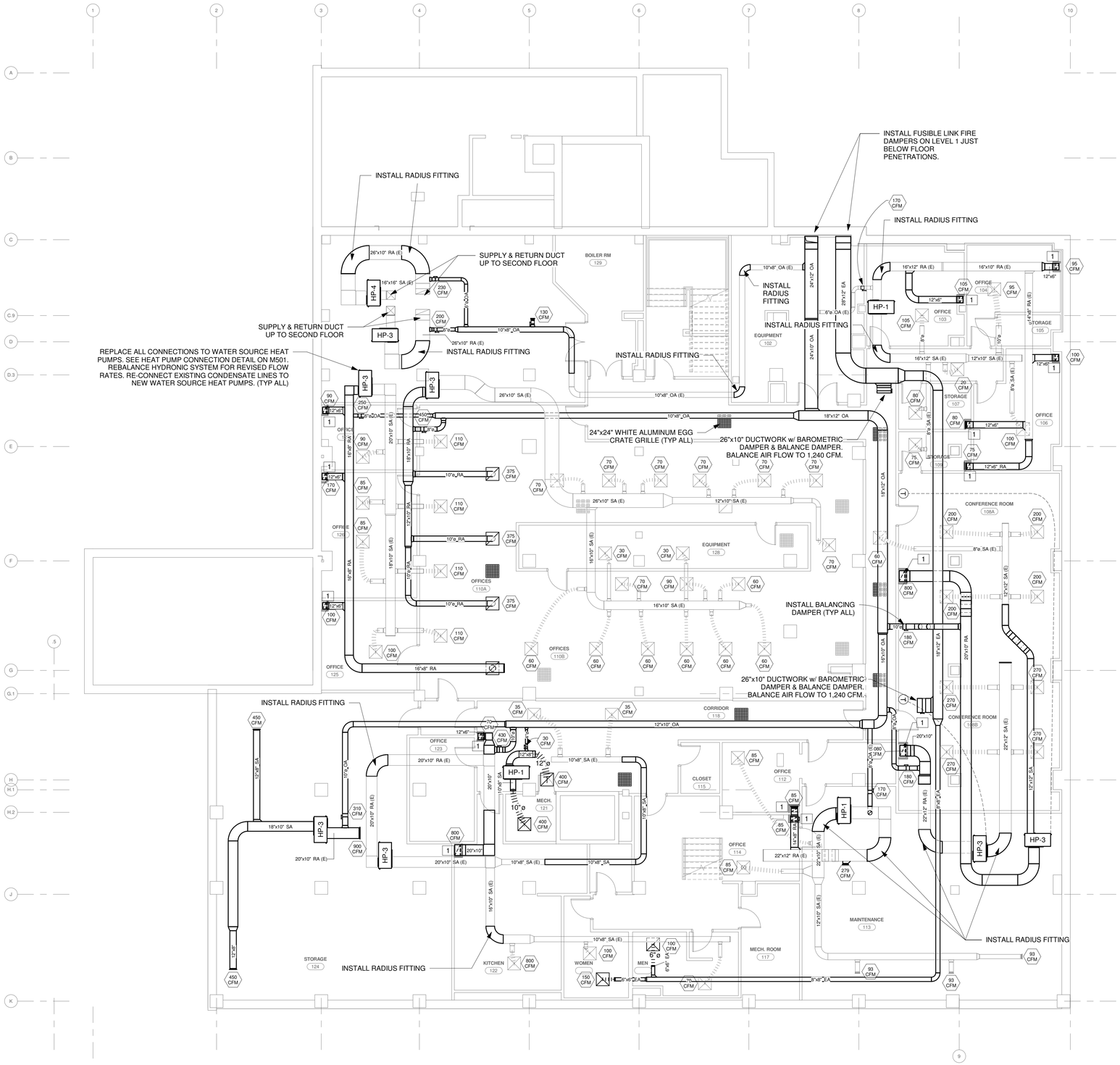
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

DEMO MECHANICAL PLAN

M007



LEVEL 1 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

SHEET NOTES

1. INSTALL NEW RETURN DUCT. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
2. A RIGID FRAME ACCESS DOOR WILL BE INSTALLED ON EACH WSHP RETURN DUCT TO PERMIT ACCESS TO CLEAN THE HEAT PUMP COIL. THE ACCESS DOORS WILL BE SECURED USING CAM/ROTARY LATCHES, NOT SCREWS. THE DOOR WILL BE 2" LESS THAN THE DUCT SHORT DIMENSION BY 1.5 TIMES THE DUCT/PLENUM SHORT DIMENSION, AS A MINIMUM SIZE (TYP ALL).
3. REPLACE THERMOSTAT IN SAME LOCATION AS EXISTING FOR EACH HEAT PUMP UNLESS OTHERWISE IS SHOWN (TYP ALL).
4. CONTRACTORS TO CONFIRM RETURN DISCHARGE CONFIGURATION PRIOR TO ORDERING (TYP ALL).

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

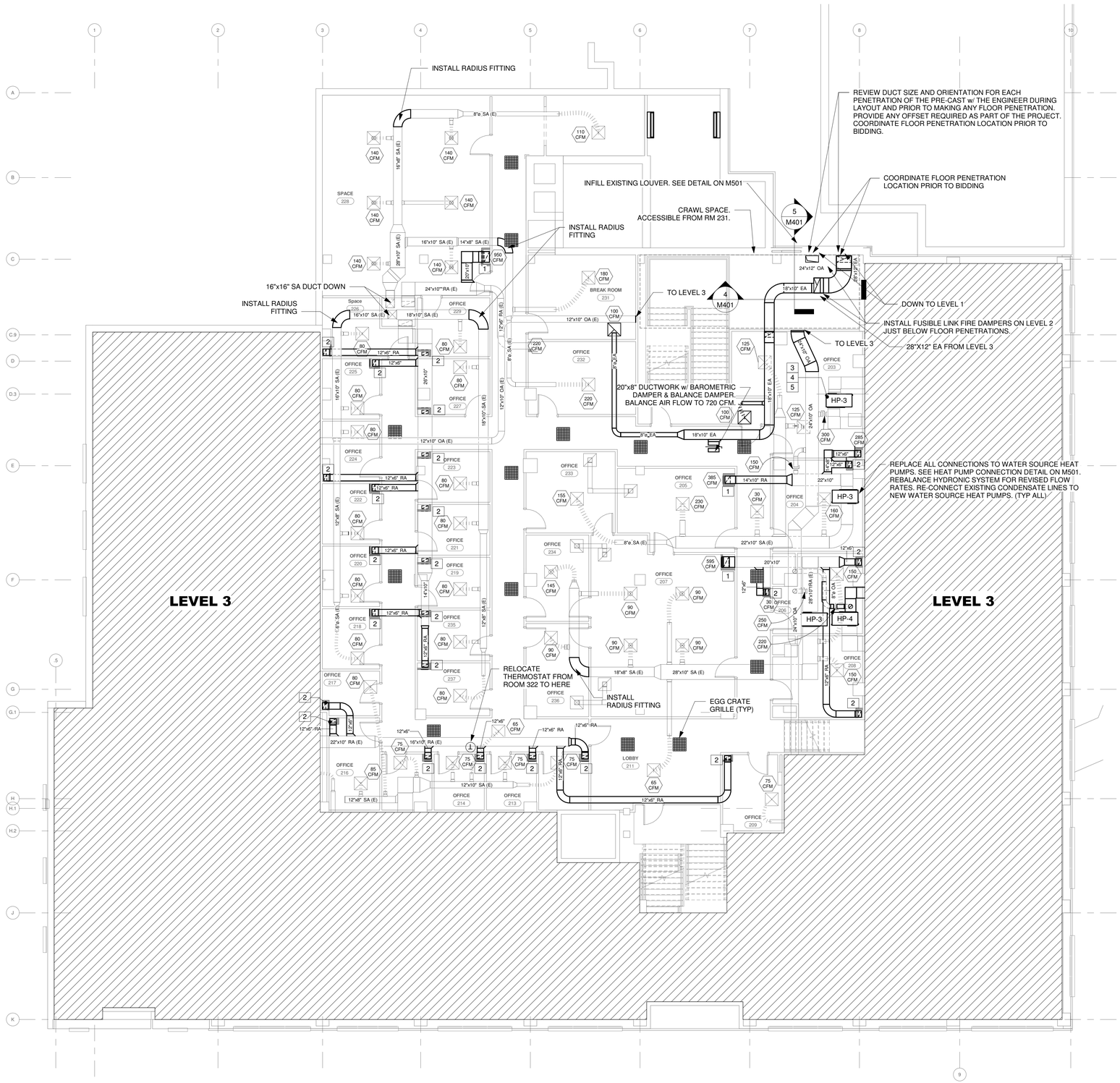
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M101



LEVEL 2 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

SHEET NOTES

1. INSTALL NEW RETURN DUCT. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
2. INSTALL 12"x6" RETURN DUCT AND MATCH RETURN CFM WITH SUPPLY CFM. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
3. A RIGID FRAME ACCESS DOOR WILL BE INSTALLED ON EACH WSHP RETURN DUCT TO PERMIT ACCESS TO CLEAN THE HEAT PUMP COIL. THE ACCESS DOORS WILL BE SECURED USING CAM/ROTARY LATCHES, NOT SCREWS. THE DOOR WILL BE 2" LESS THAN THE DUCT SHORT DIMENSION BY 1.5 TIMES THE DUCT/PLENUM SHORT DIMENSION, AS A MINIMUM SIZE (TYP ALL).
4. REPLACE THERMOSTAT IN SAME LOCATION AS EXISTING FOR EACH HEAT PUMP UNLESS OTHERWISE IS SHOWN (TYP ALL).
5. CONTRACTORS TO CONFIRM RETURN DISCHARGE CONFIGURATION PRIOR TO ORDERING (TYP ALL).

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

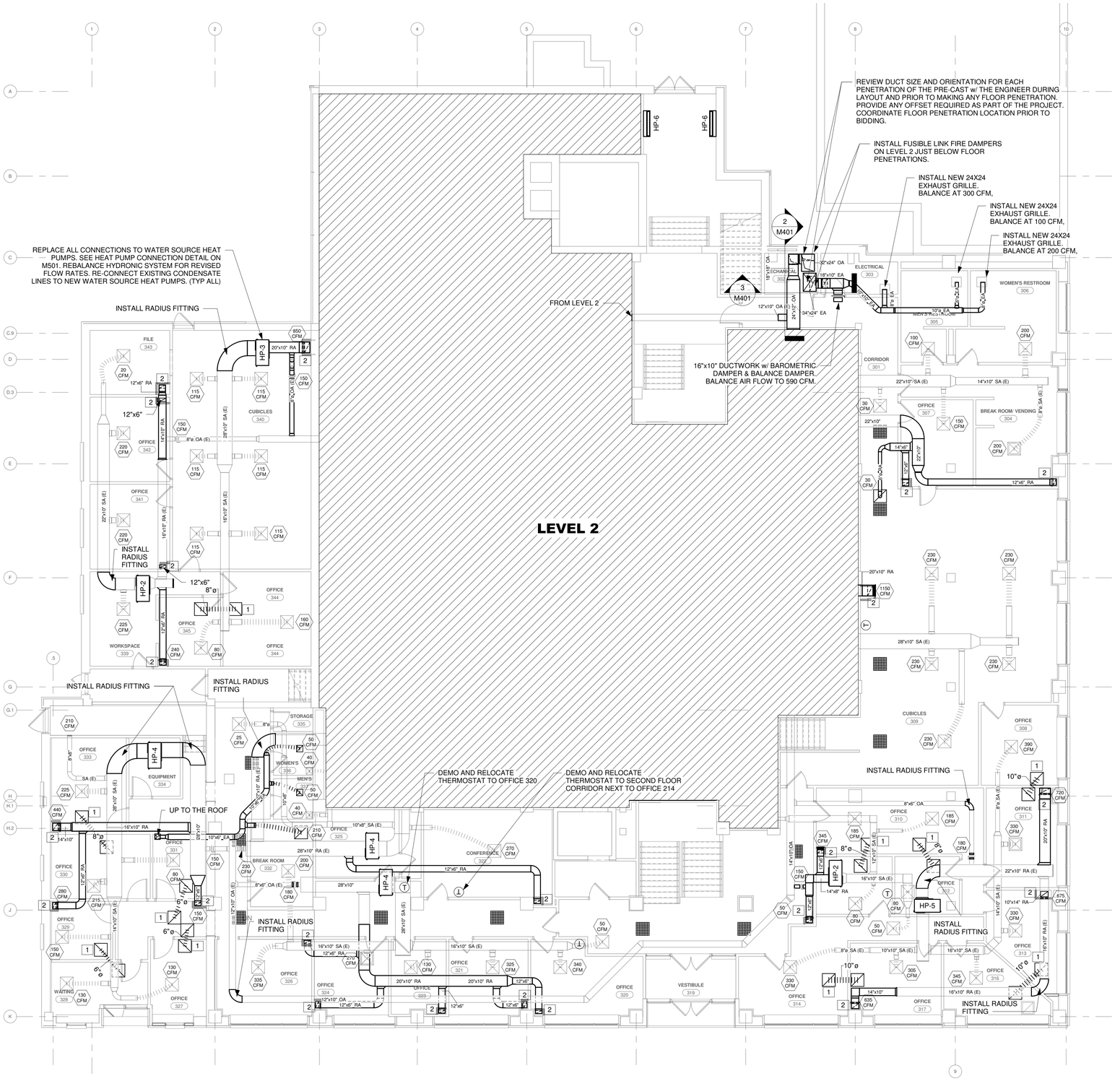
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M102



LEVEL 3 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED, INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

SHEET NOTES

1. SEE TRANSFER DUCT DETAIL ON M501
2. INSTALL NEW RETURN DUCT. MATCH RETURN CFM WITH SUPPLY CFM. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
3. A RIGID FRAME ACCESS DOOR WILL BE INSTALLED ON EACH WSHP RETURN DUCT TO PERMIT ACCESS TO CLEAN THE HEAT PUMP COIL. THE ACCESS DOORS WILL BE SECURED USING CAM/ROTARY LATCHES, NOT SCREWS. THE DOOR WILL BE 2" LESS THAN THE DUCT SHORT DIMENSION BY 1.5 TIMES THE DUCT/PLENUM SHORT DIMENSION, AS A MINIMUM SIZE (TYP ALL).
4. REPLACE THERMOSTAT IN SAME LOCATION AS EXISTING FOR EACH HEAT PUMP UNLESS OTHERWISE IS SHOWN (TYP ALL).
5. CONTRACTORS TO CONFIRM RETURN DISCHARGE CONFIGURATION PRIOR TO ORDERING (TYP ALL).

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CAMMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

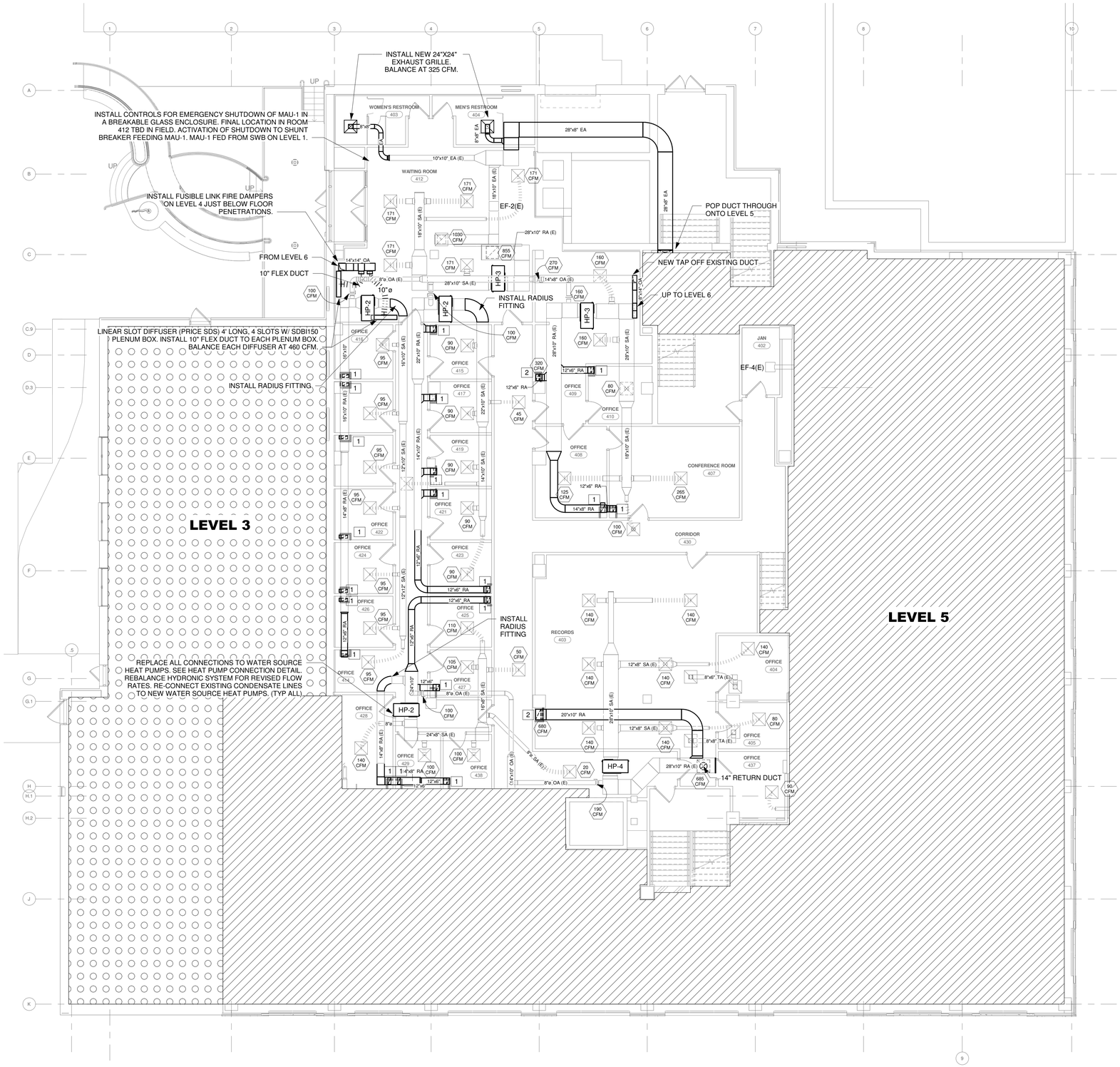
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M103



LEVEL 4 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

SHEET NOTES

1. INSTALL 12"x6" RETURN DUCT AND MATCH RETURN CFM WITH SUPPLY CFM. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
2. INSTALL NEW RETURN DUCT. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
3. A RIGID FRAME ACCESS DOOR WILL BE INSTALLED ON EACH WSHP RETURN DUCT TO PERMIT ACCESS TO CLEAN THE HEAT PUMP COIL. THE ACCESS DOORS WILL BE SECURED USING CAM/ROTARY LATCHES, NOT SCREWS. THE DOOR WILL BE 2" LESS THAN THE DUCT SHORT DIMENSION BY 1.5 TIMES THE DUCT/PLENUM SHORT DIMENSION, AS A MINIMUM SIZE (TYP ALL).
4. REPLACE THERMOSTAT IN SAME LOCATION AS EXISTING FOR EACH HEAT PUMP UNLESS OTHERWISE IS SHOWN (TYP ALL).
5. CONTRACTORS TO CONFIRM RETURN DISCHARGE CONFIGURATION PRIOR TO ORDERING (TYP ALL).

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
JOSEPH W. MILLER II
REGISTERED
15184
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

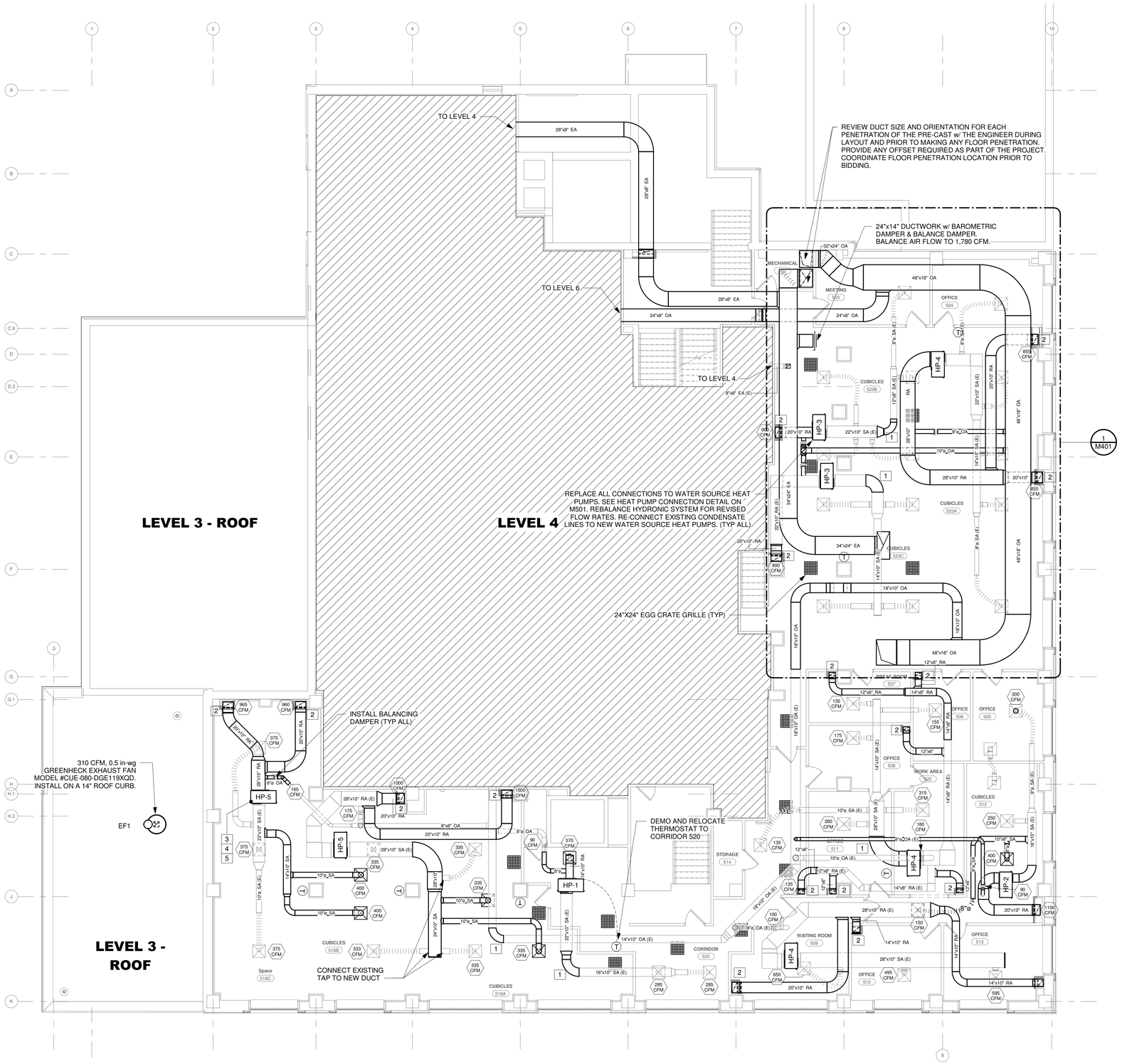
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M104



LEVEL 5 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

SHEET NOTES

1. INSTALL RADIUS FITTING
2. MATCH RETURN CFM WITH SUPPLY CFM. RETURN DUCT MUST GO DOWN IN A NEW CHASE ALONG THE EXISTING WALL. SEE RETURN WALL GRILLE DETAIL ON M502 FOR INSTALLATION & ELEVATION.
3. A RIGID FRAME ACCESS DOOR WILL BE INSTALLED ON EACH WSHP RETURN DUCT TO PERMIT ACCESS TO CLEAN THE HEAT PUMP COIL. THE ACCESS DOORS WILL BE SECURED USING CAM/ROTARY LATCHES, NOT SCREWS. THE DOOR WILL BE 2" LESS THAN THE DUCT SHORT DIMENSION BY 1.5 TIMES THE DUCT/PLENUM SHORT DIMENSION, AS A MINIMUM SIZE (TYP ALL).
4. REPLACE THERMOSTAT IN SAME LOCATION AS EXISTING FOR EACH HEAT PUMP UNLESS OTHERWISE IS SHOWN (TYP ALL).
5. CONTRACTORS TO CONFIRM RETURN DISCHARGE CONFIGURATION PRIOR TO ORDERING (TYP ALL).

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CAMMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

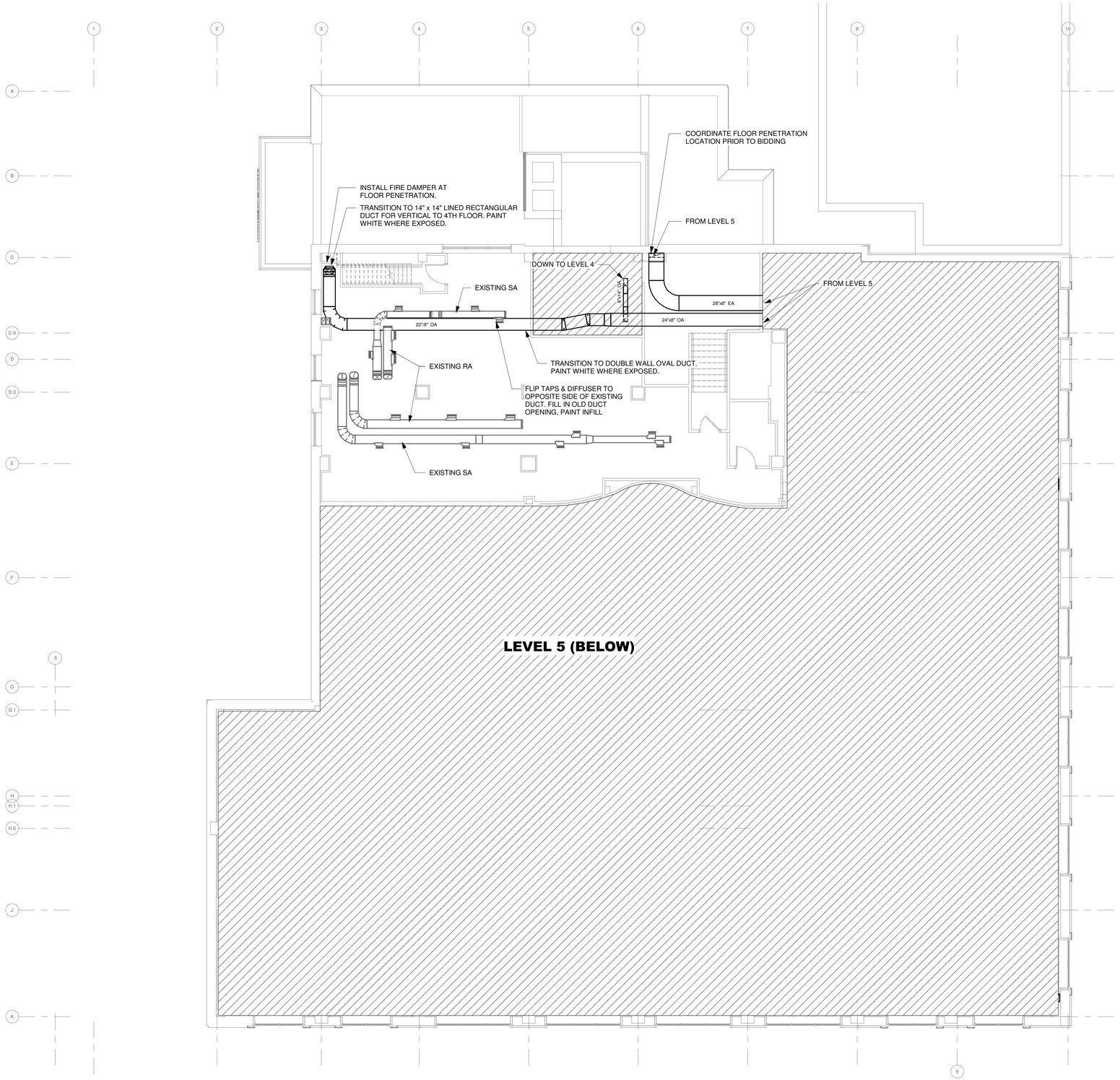
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M105



LEVEL 6 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED, INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

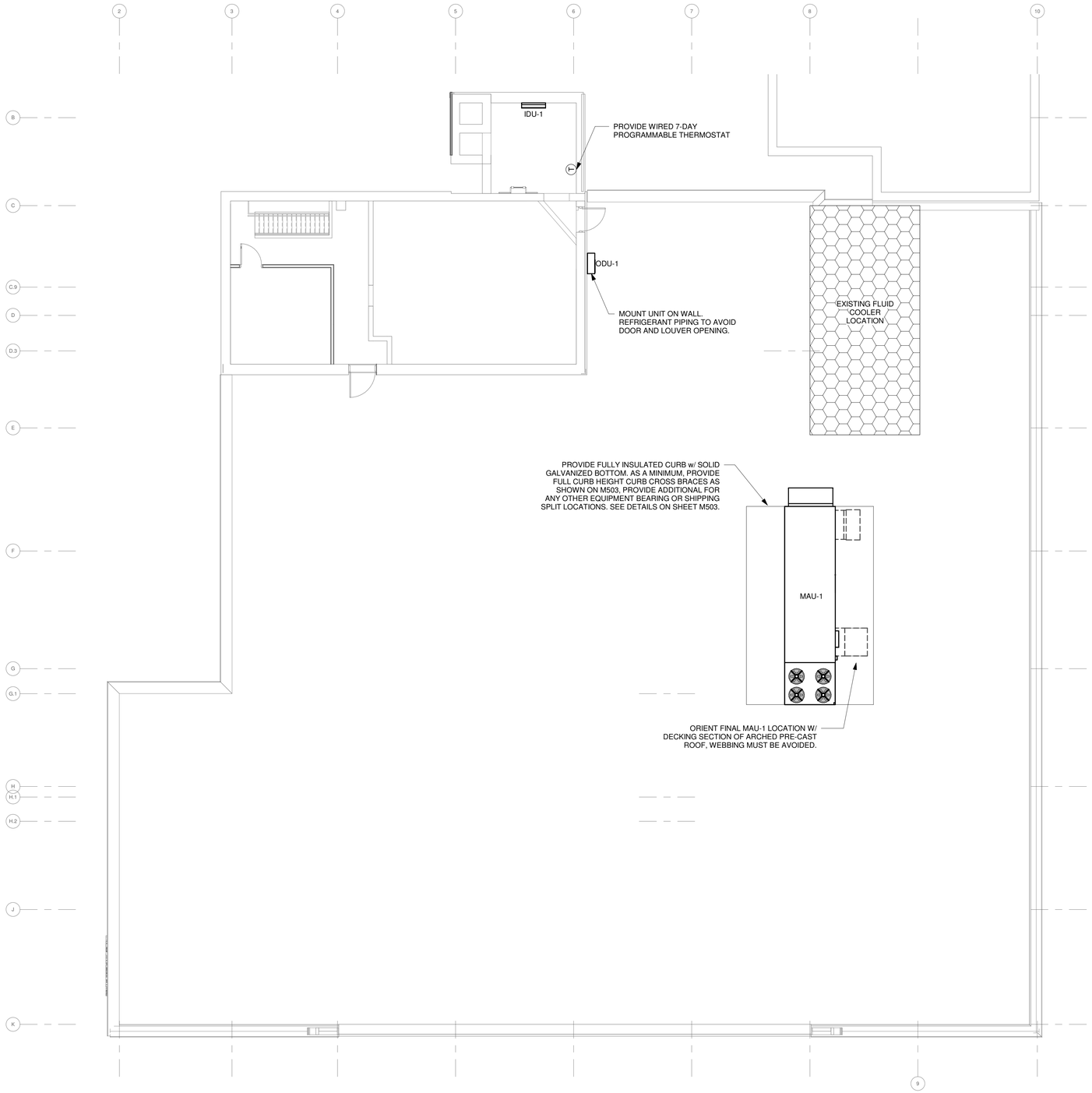
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL PLAN

M106



LEVEL 7 MECHANICAL PLAN

1/8" = 1'-0"

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED, ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
BRIAN C. MILLER REGISTERED 15184 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

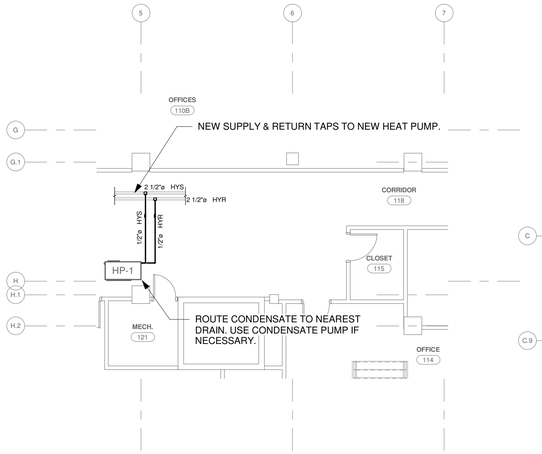
PROJECT STATUS:
CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

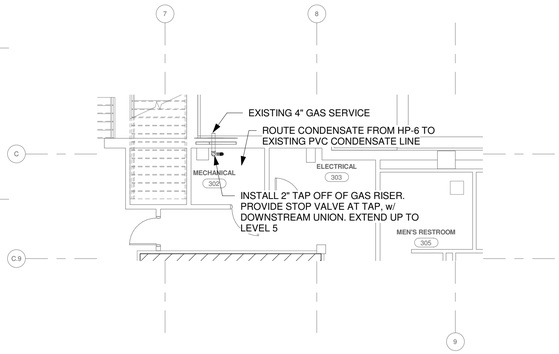
SHEET NAME:
MECHANICAL PLAN

M107



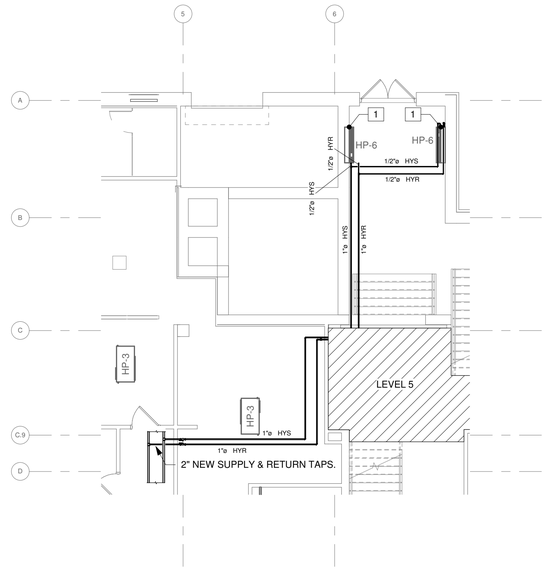
1 LEVEL 1 PARTIAL PIPING PLAN

1/8" = 1'-0"



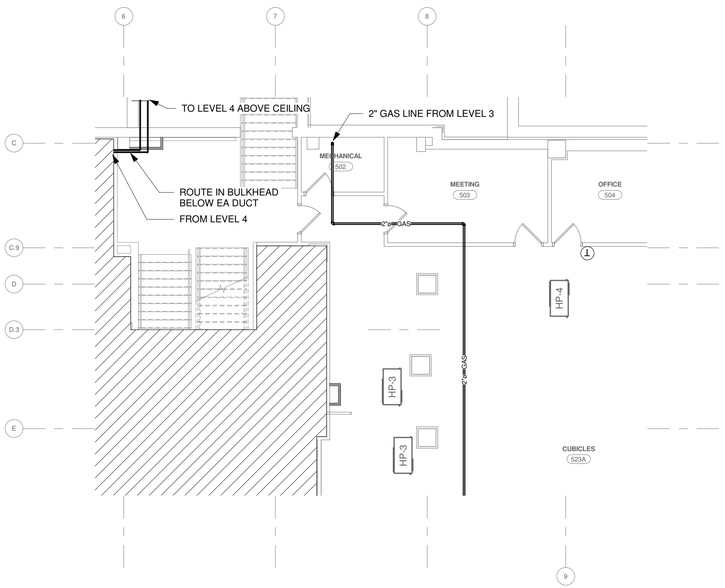
2 LEVEL 3 PARTIAL PIPING PLAN

1/8" = 1'-0"



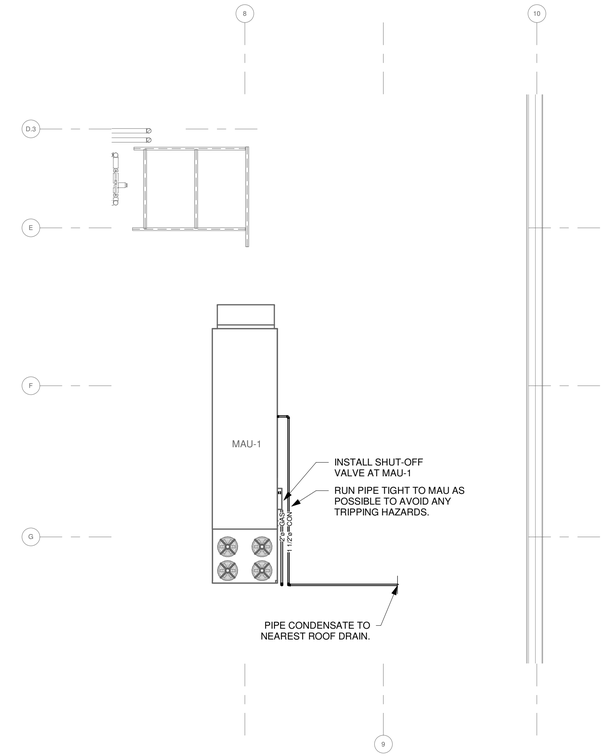
3 LEVEL 4 MECHANICAL PIPING PLAN

1/8" = 1'-0"



4 LEVEL 5 MECHANICAL PIPING PLAN

1/8" = 1'-0"



5 LEVEL 7 MECHANICAL PIPING PLAN

1/8" = 1'-0"

PIPING NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE PIPING SYSTEMS AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. NATURAL GAS PIPING IS TO BE P40 STEEL w/ BLACK IRON FITTINGS. PROVIDE WELDED GAS PIPING BY SIZE AS REQUIRED BY FUEL GAS CODE.
3. PROVIDE BALL VALVE STOPS AT ALL FIXTURES. PROVIDE UNIONS, DIRT LEGS, AND REGULATORS ON ALL EQUIPMENT.
4. COORDINATE ALL STUB-UPS AND FIELD ADJUST LOCATIONS FOR COORDINATION AS NECESSARY. AVOID EXCESSIVE ADDITIONAL PIPE FITTINGS.
5. PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP IN THE HEATING WATER, CHILLED WATER, AND OTHER CLOSED WATER PIPING SYSTEMS. ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT BOTTOM OF RISERS AND LOW POINTS.
6. UNLESS OTHERWISE NOTED, ALL PIPING IS TO OVERHEAD, TIGHT TO UNDERSIDE OF STRUCTURE OR DECK w/ SPACE FOR INSULATION.
7. INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, ETC. ARE ACCESSIBLE.
8. ALL BALANCING VALVES SHALL BE PROVIDED w/ POSITION INDICATORS AND MANUAL ADJUSTABLE STOPS.
9. ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
10. UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES, AND IN LONG PIPING RUNS O PERMIT DISASSEMBLY FOR ALTERATIONS AND REPAIRS.
11. ALL PIPING SHALL CLEAR DOORS AND WINDOWS. ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
12. ALL PIPING WORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
13. PROVIDED FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS, CHILLERS, COOLING TOWERS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION EXCEPT WATER COILS.
14. ALL WORK TO MEET REQUIREMENTS OF CURRENT INTERNATIONAL PLUMBING CODE, INTERNATIONAL MECHANICAL CODE, APPLICABLE LOCAL CODES, LOCAL UTILITY REQUIREMENTS, AND THE INTERNATIONAL FUEL GAS CODE.
15. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ECT. IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
16. INSULATE ALL CONDENSATE PIPING.

SHEET NOTES

1. INSTALL CONDENSATE PUMP (LITTLE GIANT VCL 45ULS OR EQUAL) UNDER HP-6 IN STEEL BASE (SEE M502). INSTALL 3/8" OD COPPER TUBE FROM CONDENSATE PUMP TO EXISTING PVC DRAIN IN ROOM 302.

PIPE SYSTEM LEGEND

ABBREVIATION	SYSTEM TYPE
CON	CONDENSATE
GAS	NATURAL GAS
HYR	HYDRONIC RETURN
HYS	HYDRONIC SUPPLY

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

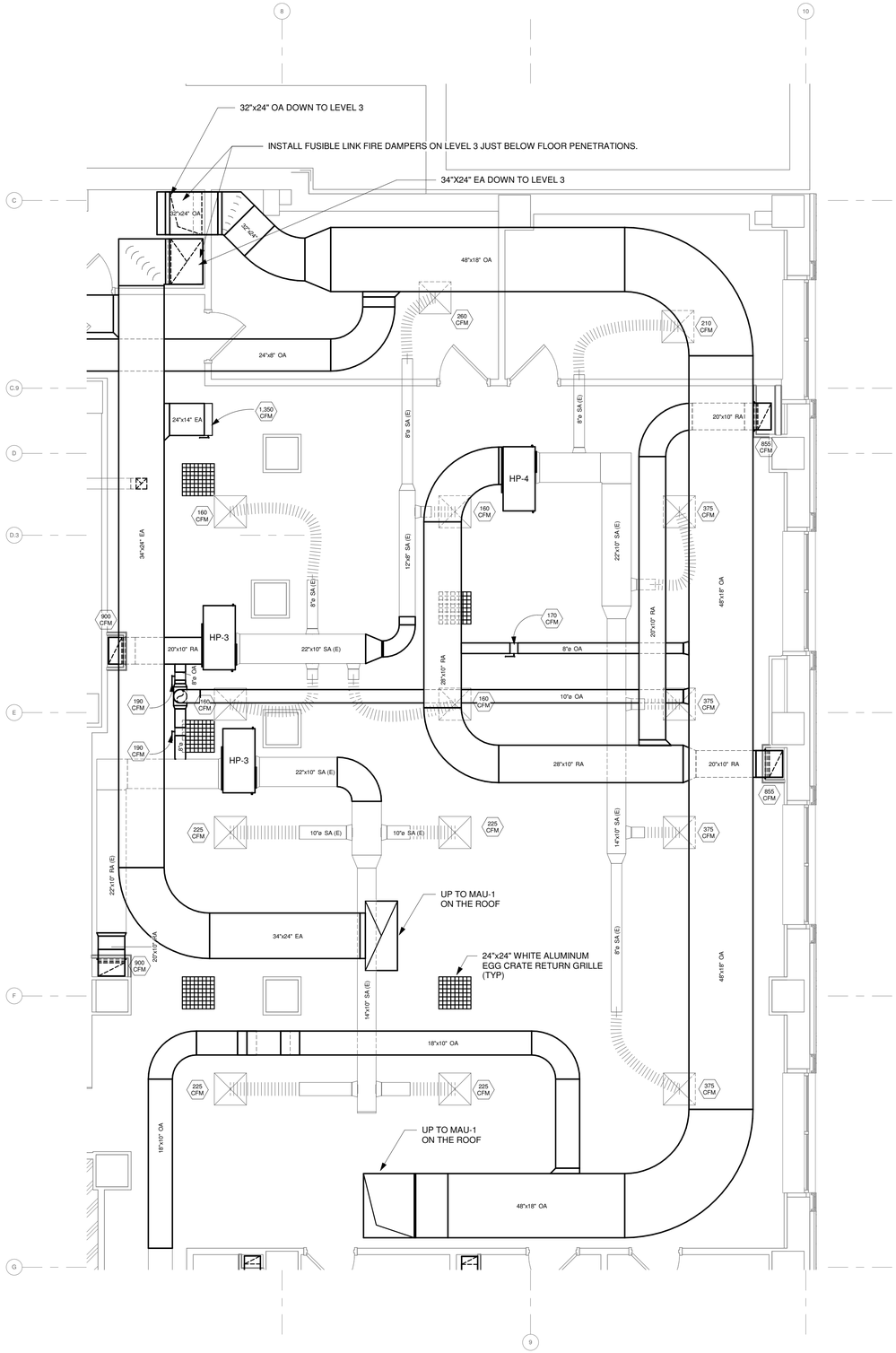
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

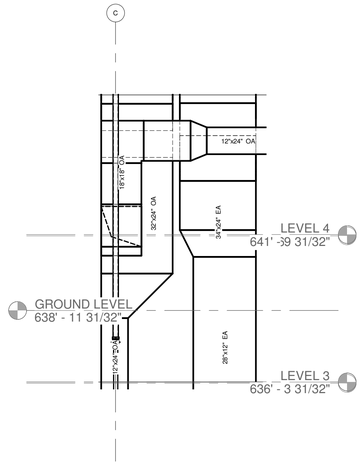
SHEET NAME:

MECHANICAL PLAN

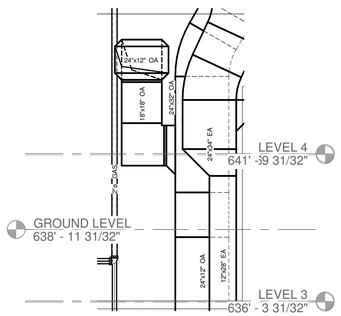
M108



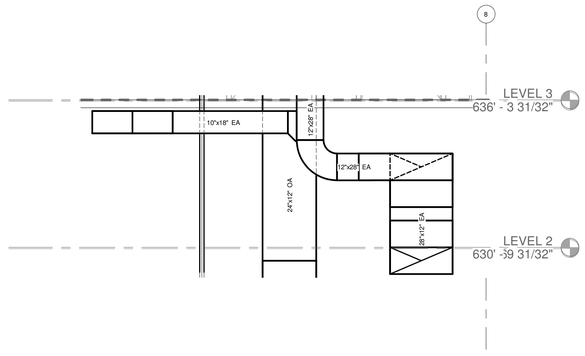
1 ENLARGED LEVEL 5 MECHANICAL DUCTWORK PLAN
1/4" = 1'-0"



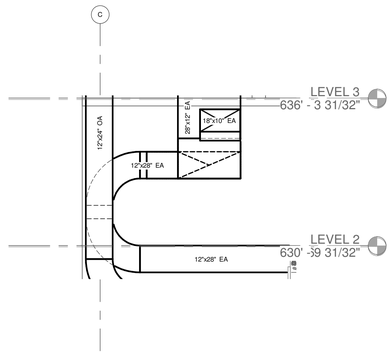
2 RM 302 SECTION 1
3/8" = 1'-0"



3 RM 302 SECTION 2
3/8" = 1'-0"



4 CRAWL SPACE SECTION 1
3/8" = 1'-0"



5 CRAWL SPACE SECTION 2
3/8" = 1'-0"

DUCT SYSTEM LEGEND

ABBREVIATION	SYSTEM NAME
EA	EXHAUST AIR
EA (E)	EXISTING EXHAUST AIR
OA	OUTSIDE AIR (SUPPLY)
OA (E)	EXISTING OUTSIDE AIR
RA	RETURN AIR
RA (E)	EXISTING RETURN AIR
SA	SUPPLY AIR
SA (E)	EXISTING SUPPLY AIR
TA	TRANSFER AIR
TA (E)	EXISTING TRANSFER AIR

MECHANICAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL, COMPLETE, AND OPERATE AS INDICATED ON THE DRAWINGS, SPECIFICATIONS, AND REQUIRED BY CODE.
2. SEPARATE BALANCE DAMPERS WILL BE INSTALLED AT ALL TAKE-OFFS FROM MAIN DUCTS. FIRE DAMPERS WILL BE INSTALLED AT LOCATIONS SHOWN OR WHERE ANY DUCT PENETRATES A FIRE RATED WALL. FIRE DAMPERS ARE TO MATCH THE RATING OF THE WALL OR CEILING BEING PENETRATED.
3. ALL DUCT TAKE-OFFS AND TRANSITIONS WILL BE TAPERED. ELBOWS AND TURNS SHALL BE CONSTRUCTED w/ A SMOOTH RADIUS FITTING MIN 1.5 TIMES THE WIDTH OF THE DUCT. TURNING VANES ARE NOT PERMITTED, UNLESS APPROVED BY ENGINEER OR INDICATED ON DRAWINGS.
4. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THOSE ITEMS.
5. ALL DUCTWORK IS TO BE EXTERNALLY INSULATED. INTERIOR MOUNTED DUCTWORK SHALL HAVE FOIL FACED 1-1/2 TO 2" FIBERGLASS INSULATION AND SEALED w/ FIBERGLASS REINFORCED FOIL TAPE.
6. CONSTRUCT ALL DUCTWORK PER SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK (2.0" STATIC). ALL JOINTS ARE TO BE SEALED w/ MASTIC.
7. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTAT AT 5'-0" ABOVE FINISHED FLOOR. FINAL THERMOSTAT LOCATION BY OWNER/ARCHITECT.
8. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
9. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING WHERE APPLICABLE.
10. COORDINATE DIFFUSERS, REGISTER, AND GRILLE LOCATIONS w/ ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO SUIT.
11. LOCATE ALL MECHANICAL EQUIPMENT FOR UN-OBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROL, AND VALVING.
12. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURAL, WITH SPACE FOR INSULATION.
13. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 3'-0". FLEXIBLE DUCT IS TO BE USED FOR FINAL CONNECTIONS TO GRILLES AND DIFFUSERS ONLY.
14. ALL DUCTWORK SHALL BE COORDINATED w/ ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
15. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER ITEMS LOCATED IN DUCTWORK WHICH REQUIRE SERVICE OR INSPECTION.
16. SEE SPEC FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.
17. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS. LOUVER SIZES, LOCATIONS, MOUNTING, AND DETAILS SHALL BE COORDINATED w/ OTHER TRADES INVOLVED.
18. PERFORM WORK IN ACCORDANCE w/ CURRENT INTERNATIONAL MECHANICAL CODE, FUEL GAS CODE, ASHRAE, SMACNA, STATE, AND LOCAL CODES AND REQUIREMENTS.
19. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.
20. VERIFY SA AND RA DUCT CONFIGURATIONS IN FIELD PRIOR TO ORDERING AND INSTALLING WSHP.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
CRAIG W. MILLER REGISTERED 15184 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

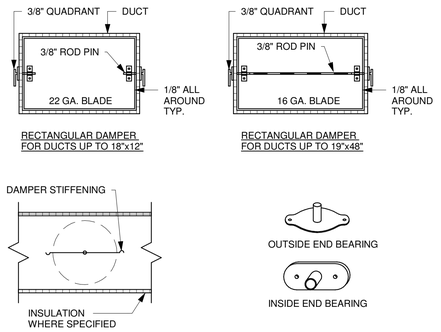
PROJECT STATUS:
CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

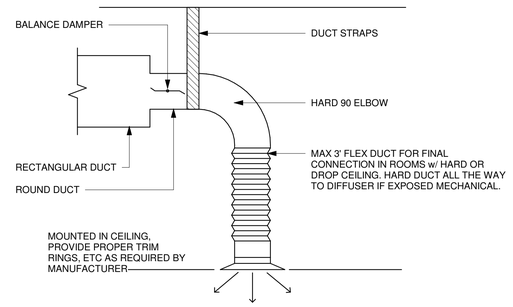
PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:
MECHANICAL ENLARGED PLANS

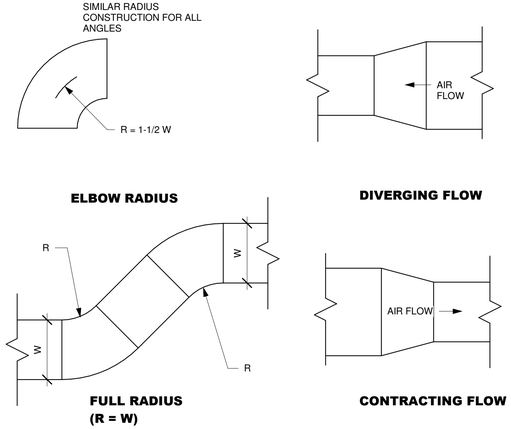
M401



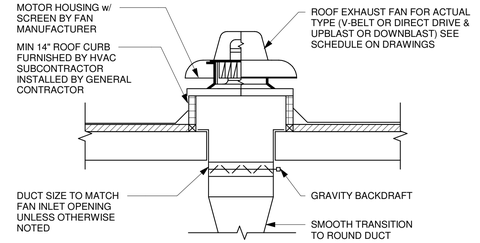
1 BALANCE DAMPER DETAIL
DRAWING NOT SCALABLE



2 DIFFUSER CONNECTION DETAIL
DRAWING NOT SCALABLE

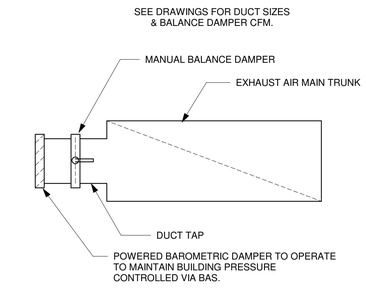


3 DUCT TRANSITION DETAIL
DRAWING NOT SCALABLE

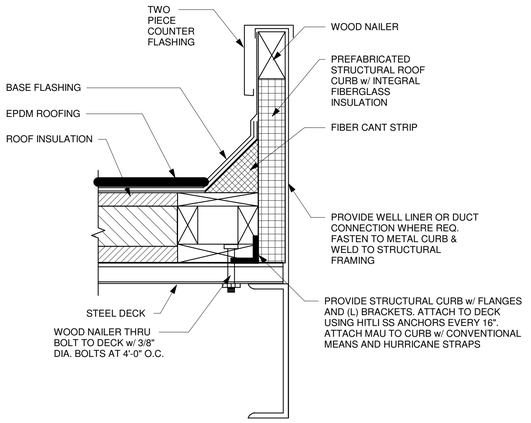


NOTE:
1. ROOF PENETRATION & FLASHING TO BE BY ORIGINAL ROOF MANUFACTURER CERTIFIED PERSON TO MAINTAIN WARRANTY.
2. PROVIDE OWNER w/ INSPECTION DOCUMENTATION AS REQUIRED BY MANUFACTURER TO MAINTAIN ROOF WARRANTY.

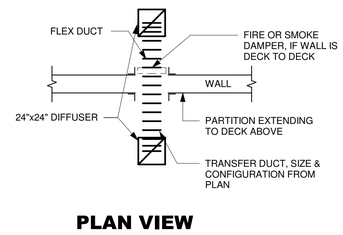
4 EXHAUST FAN DETAIL
DRAWING NOT SCALABLE



5 RELIEF DAMPERS DETAIL
DRAWING NOT SCALABLE

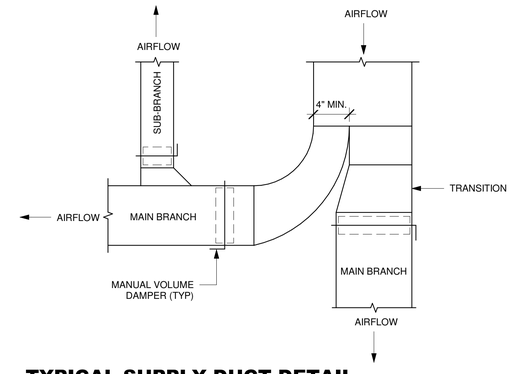


6 ROOF CURB DETAIL
DRAWING NOT SCALABLE

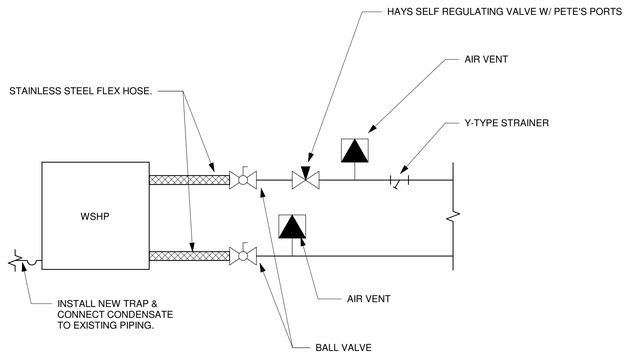


PLAN VIEW

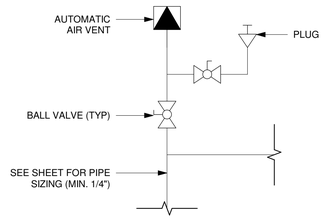
7 TRANSFER DUCT DETAIL
DRAWING NOT SCALABLE



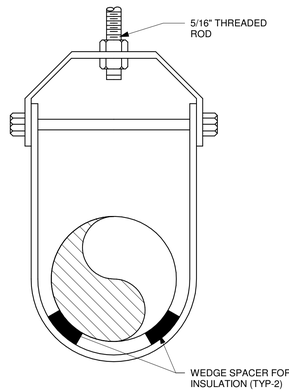
8 TYPICAL SUPPLY DUCT DETAIL
DRAWING NOT SCALABLE



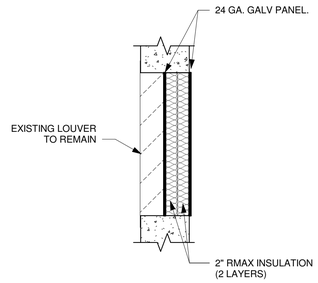
9 HEAT PUMP CONNECTION DETAIL
DRAWING NOT SCALABLE



10 AIR VENT DETAIL
DRAWING NOT SCALABLE



11 WEDGE SPACE PIPE HANGER DETAIL
DRAWING NOT SCALABLE



12 EXISTING LOUVER INFILL DETAIL
DRAWING NOT SCALABLE

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

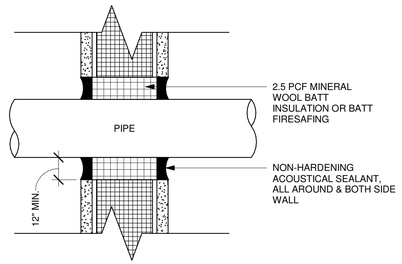
PROJECT STATUS:
CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

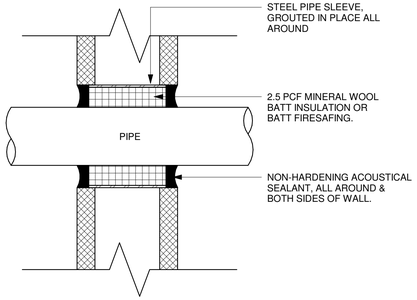
SHEET NAME:
MECHANICAL DETAILS

M501



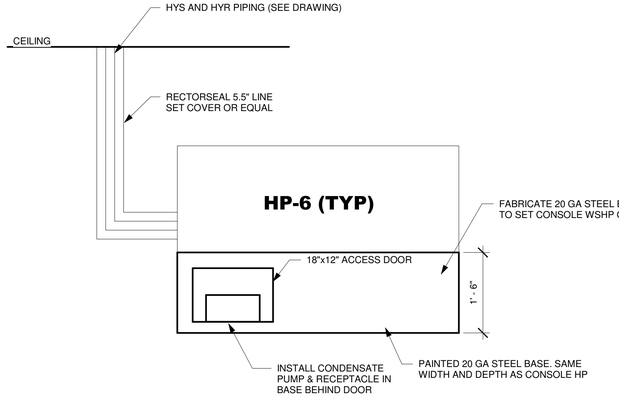
GENERAL NOTES:
1. WHERE EXPOSED TO ROOM, PROVIDE ESCUTCHEON TRIM.
2. NO DRYWALL TAPE OR COMPOUND BRIDGING BETWEEN DRYWALL & PIPE.
3. SUPPORT PIPE TO PREVENT CONTACT w/ DRYWALL

1 INTERIOR WALL GWB PENETRATION
DRAWING NOT SCALABLE

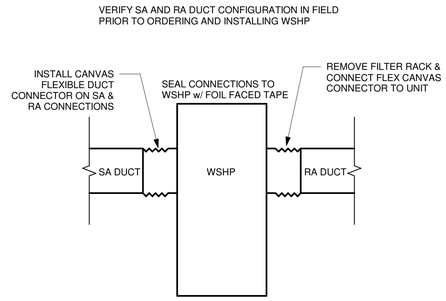


GENERAL NOTES:
1. WHERE EXPOSED TO ROOM, PROVIDE ESCUTCHEON TRIM.
2. NO MORTAR BRIDGING BETWEEN PIPE & CMU.
3. SUPPORT PIPE TO PREVENT CONTACT w/ SLEEVE.

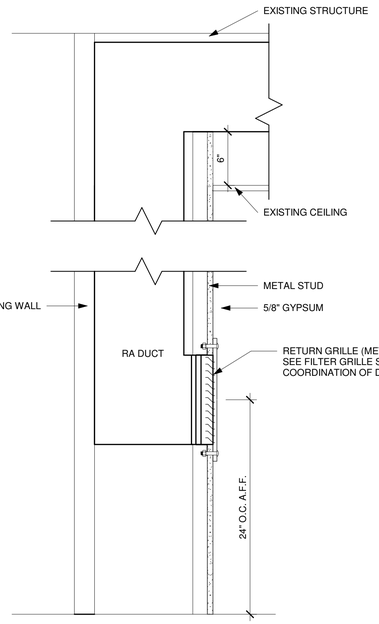
2 INTERIOR WALL CMU PENETRATION
DRAWING NOT SCALABLE



3 CONSOLE WSHP BASE DETAIL (TYP)
DRAWING NOT SCALABLE

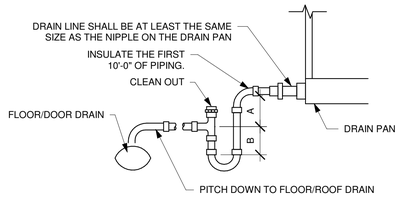


4 WSHP DUCT CONNECTIONS (PLAN VIEW)(TYP)
DRAWING NOT SCALABLE



FILTER GRILLE SCHEDULE

RANGE (CFM)	FILTER GRILLE	DUCT SIZE	CHASE (EXTERNAL)
0 - 300	10X10	12"X6"	16"X8"
300 - 600	12X20	14"X10"	18"X12"
600 - 1000	14X24	20"X10"	24"X12"

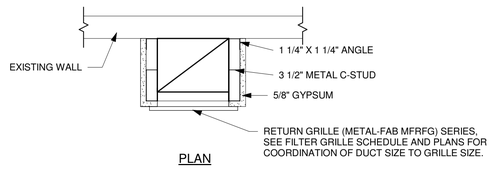


UNIT TYPE	A	B
DRAW THROUGH	P+1"	P
BLOW THROUGH	2" MIN.	2P

P = STATIC PRESSURE OF UNITS IN INCHES OF H20

5 CONDENSATE DRAIN DETAIL
DRAWING NOT SCALABLE

SECTION



PLAN

6 WALL RETURN GRILLE CHASE DETAIL (TYP)
DRAWING NOT SCALABLE

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

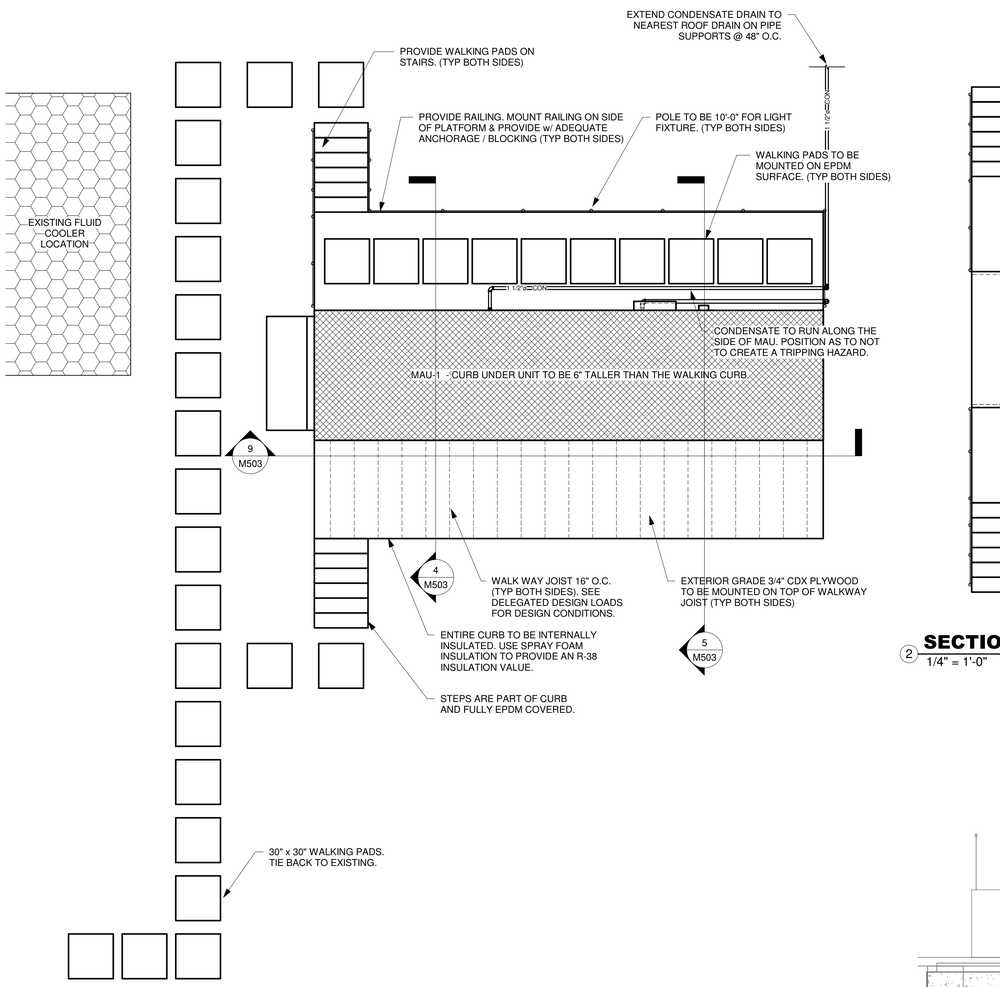
PROJECT STATUS:
CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

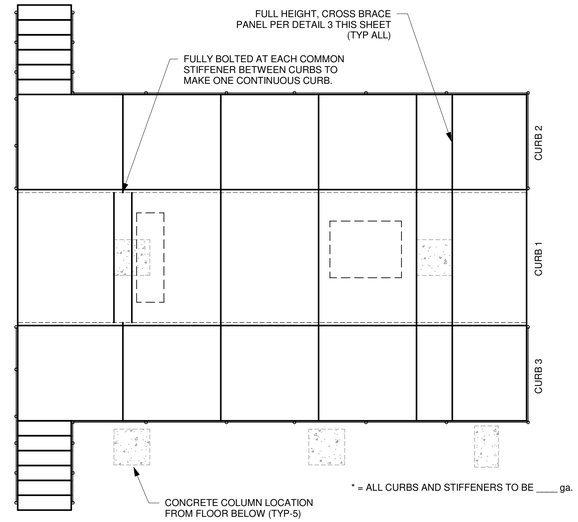
PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:
MECHANICAL DETAILS

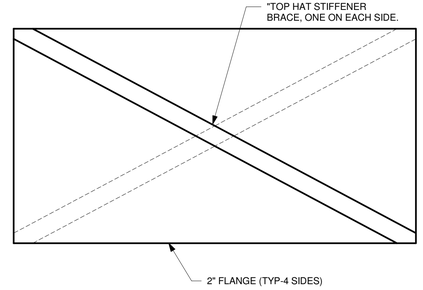
M502



1 MAU EQUIPMENT CURB PLAN
1/4" = 1'-0"



2 SECTIONED CURB PLAN DETAIL
1/4" = 1'-0"

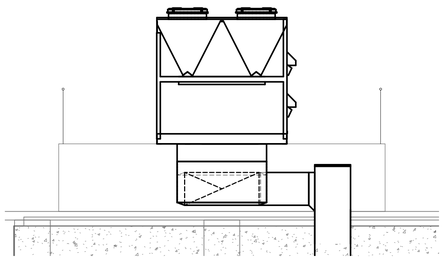


3 CROSS BRACE PANEL DETAIL
DRAWING NOT SCALABLE

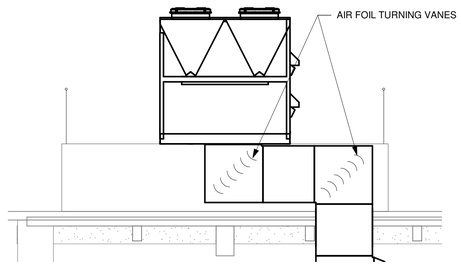
DELEGATED DESIGN LOADS

APPLICABLE CODES: INTERNATIONAL BUILDING CODE-2015, ASCE 7-2010

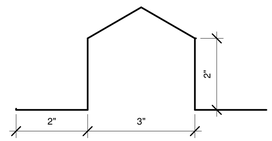
- LIVE LOADS
  - ROOF LIVE LOAD: 20 PSF UNIFORM, 300 LBS CONCENTRATED
- ROOF SNOW LOAD DATA
  - GROUND SNOW LOAD: (CASE STUDY AREA) 40 PSF UNIFORM
  - SNOW EXPOSURE FACTOR: 1.0
  - SNOW IMPORTANCE FACTOR: 1.00
  - THERMAL FACTOR: 1.0
  - DRIFT SURCHARGE LOADS: PER ASCE FOR CONFIGURATION
  - WIDTH OF SNOW DRIFTS: PER ASCE FOR CONFIGURATION
- WIND SNOW LOAD DATA
  - BASIC WIND SPEED: 115 MPH
  - RISK CATEGORY: II
  - WIND EXPOSURE: EXPOSURE B
- EARTHQUAKE DESIGN DATA
  - RISK CATEGORY: II
  - SEISMIC IMPORTANCE FACTOR: 1.00
  - SITE CLASS: NO GEOTECHNICAL DATA, CLASS D ASSUMED
  - SEISMIC DESIGN CATEGORY: CATEGORY A
- RAILING LOADS
  - 50 LBS PER FOOT UNIFORM
  - 200 LBS CONCENTRATED



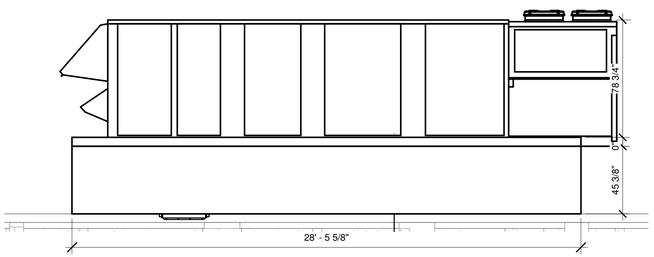
4 MAU-1 EXHAUST DUCTWORK SECTION
1/4" = 1'-0"



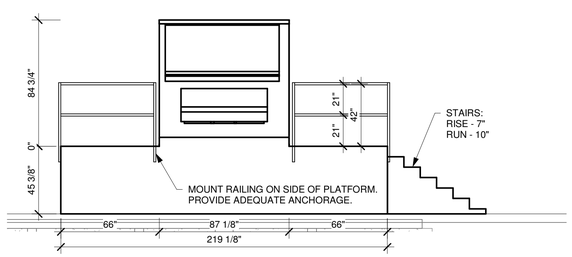
5 MAU-1 OUTSIDE AIR DUCTWORK
1/4" = 1'-0"



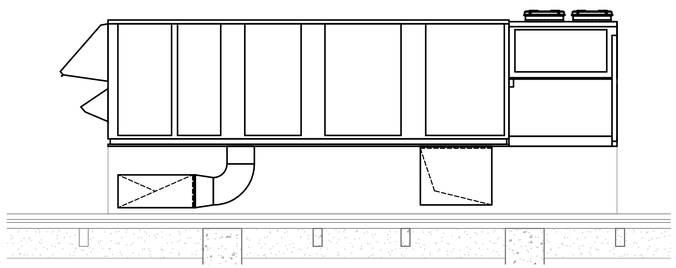
6 TOP HAT BRACE DETAIL
DRAWING NOT SCALABLE



7 EQUIPMENT CURB FRONT DETAIL
1/4" = 1'-0"



8 EQUIPMENT CURB END DETAIL
1/4" = 1'-0"



9 MAU-1 DUCTWORK SECTION
1/4" = 1'-0"

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	BCM
DRAWN BY:	TWT/JMM/MEA
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL DETAILS

M503

MAKE UP AIR UNIT SCHEDULE

MARK	MFR.	MODEL	HEAT OPTION	AIR FLOW	OUTSIDE AIR SUPPLY FAN		EXHAUST AIR FAN		COOLING COIL INFORMATION						HEATING INFORMATION			COMPRESSOR POWER	ELECTRICAL DATA				NOTES
					E.S.P.	FAN HP	E.S.P.	FAN HP	LOADS		TEMPERATURE RATE				INPUT CAPACITY	TEMPERATURE RATE			PHASE	MCA	MOCP	VOLTAGE	
									SENSIBLE	TOTAL CAPACITY	EDB	EWB	LDB	LWB		ENT. AIR TEMP	LVG. AIR TEMP						
MAU-1	CARRIER	62X335YLKF-JGTFTAG	NATURAL GAS	8,000 CFM	1.50 in-wg	7.5 hp	1.00 in-wg	7.5 hp	236,200 Btu/h	406,800 Btu/h	79.7 °F	69.1 °F	52.7 °F	52.7 °F	500,000 Btu/h	45.8 °F	92.2 °F	42.43 KW	3	87 A	110 A	480 V	PROVIDE w/ INTEGRAL DISCONNECT; 8000 CFM DOAS UNIT WITH INTEGRAL ERV (SEE SCHEDULE FOR ERV PERFORMANCE). NATURAL GAS FIRED HEATING, DX COOLING. VARIABLE SEED FAN W/ INTEGRAL VFD. SINGLE POINT ELECTRICAL CONNECTION. NATIVE BACNET CARD. VARIABLE SPEED COMPRESSOR. TOUCH ACCESSORY PART # EQT1-4-CAR. UNIT WILL ENABLE COOLING/DEHUMIDIFICATION AND HEATING BASED ON CONFIGURABLE SUPPLY AIR SETPOINTS FROM BAS.

ENERGY RECOVERY VENTILATOR SCHEDULE (INTEGRAL TO MAKE-UP AIR UNIT)

MARK	O.A AIR FLOW	E.A. AIR FLOW	EXT. STATIC PRESSURE		COOLING COIL INFORMATION																						
			SUPPLY FAN	EXHAUST FAN	O.A. DB	O.A. WB	PRE-TREATED O.A. DB	PRE-TREATED O.A. WB	RETURN AIR DB	RETURN AIR WB	E.A. DB	E.A. WB	TOTAL CAPACITY	LATENT EFFECTIVENESS	SENSIBLE EFFECTIVENESS	TOTAL EFFECTIVENESS	O.A. DB	O.A. WB	PRE-TREATED O.A. DB	PRE-TREATED O.A. WB	RETURN AIR DB	RETURN AIR WB	E.A. DB	E.A. WB	E.A. AIR PD	TOTAL CAPACITY	LATENT EFFECTIVENESS	SENSIBLE EFFECTIVENESS	TOTAL EFFECTIVENESS	COMMENTS
ERV-1	8000 CFM	8000 CFM	1.5 in-wg	1.0 in-wg	89 °F	78 °F	79.7 °F	69.1 °F	76 °F	64 °F	84.9 °F	73.6 °F	287,300 Btu/h	66%	71%	67%	2 °F	0 °F	45.8 °F	35.4 °F	70 °F	50 °F	19.5 °F	16.7 °F	0.77 IN WG	-440.62 Btu/h	68%	74%	73%	ERV IS PART OF PACKAGED ASSEMBLY W/ MAU-1.

DUCTLESS SPLIT SYSTEM INDOOR UNIT SCHEDULE

MARK	SERVES	MFR	MODEL	COOLING	HEATING (5°F)	PHASE	VOLTS	MCA/MOCP	COMMENTS
IDU-1	FREIGHT ELEVATOR MACHINE RM	CARRIER	40MHHQ24---3	24,000 Btu/h	16,760 Btu/h	1	208 V	FED FROM ODU-1	DUCTLESS HIGH WALL UNIT. PROVIDE A WIRED 7-DAY PROGRAMMABLE THERMOSTAT

DUCTLESS SPLIT SYSTEM OUTDOOR UNIT SCHEDULE

MARK	INDOOR UNITS SERVED	MFR	MODEL	CAPACITIES		ELECTRICAL				COMMENTS
				COOLING	HEATING (5°F)	PHASE	VOLTS	MCA	MOCP	
ODU-1	IDU-1	CARRIER	38MHRBQ24AA3	24,000 Btu/h	16,760 Btu/h	1	208 V	18 A	25 A	WALL MOUNTED COMFORT SERIES HEAT PUMP W/ BASEPAN HEATER.

HEAT PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	COOLING CAPACITY	HEATING CAPACITY	E.S.P.	FLUID TYPE	GPM	Δ P (ft w.g)	ELECTRICAL DATA				NOTES
									VOLTAGE	PHASE	MCA	MOCP	
HP-1	CARRIER	50PCH018	16,400 Btu/h	20,600 Btu/h	0.50 in-wg	30% PROP. GLYCOL	4.5 GPM	10.3	277 V	1	9.0 A	15 A	HORIZONTAL WSHP. HOT GAS REHEAT. ECM FAN W/ DIGITAL SCROLL COMPRESSOR. INTEGRAL CONTROL VALVE. PROVIDE W/ CARRIER THERMOSTAT & HUMIDISTAT. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL
HP-2	CARRIER	50PTH024	22,000 Btu/h	28,800 Btu/h	0.64 in-wg	30% PROP. GLYCOL	6.5 GPM	8.6	480 V	3	6.0 A	15 A	HORIZONTAL WSHP. HOT GAS REHEAT. ECM FAN W/ DIGITAL SCROLL COMPRESSOR. INTEGRAL CONTROL VALVE. PROVIDE W/ CARRIER THERMOSTAT & HUMIDISTAT. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL. 2 STAGE UNIT
HP-3	CARRIER	50PTH036	35,000 Btu/h	44,600 Btu/h	0.71 in-wg	30% PROP. GLYCOL	8.5 GPM	12.6	480 V	3	10.0 A	15 A	HORIZONTAL WSHP. HOT GAS REHEAT. ECM FAN W/ DIGITAL SCROLL COMPRESSOR. INTEGRAL CONTROL VALVE. PROVIDE W/ CARRIER THERMOSTAT & HUMIDISTAT. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL. 2 STAGE UNIT
HP-4	CARRIER	50PTH048	44,500 Btu/h	57,000 Btu/h	0.60 in-wg	30% PROP. GLYCOL	12.7 GPM	12.8	480 V	3	11.0 A	15 A	HORIZONTAL WSHP. HOT GAS REHEAT. ECM FAN W/ DIGITAL SCROLL COMPRESSOR. INTEGRAL CONTROL VALVE. PROVIDE W/ CARRIER THERMOSTAT & HUMIDISTAT. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL. 2 STAGE UNIT
HP-5	CARRIER	50PTH060	56,500 Btu/h	74,300 Btu/h	0.73 in-wg	30% PROP. GLYCOL	15.6 GPM	13.2	480 V	3	13.0 A	20 A	HORIZONTAL WSHP. HOT GAS REHEAT. ECM FAN W/ DIGITAL SCROLL COMPRESSOR. INTEGRAL CONTROL VALVE. PROVIDE W/ CARRIER THERMOSTAT & HUMIDISTAT. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL. 2 STAGE UNIT
HP-6	CARRIER	50PEC	15,600 Btu/h	21,300 Btu/h	0.00 in-wg	30% PROP. GLYCOL	4.5 GPM	9.8	277 V	1	8.0 A	15 A	CABINET WSHP. INTEGRAL ZONE TEMP SENSOR. NATIVE BACNET CARD W/ OPEN SOURCE CONTROL PROTOCOL.

NOTE: VALUES BASED ON HEATING WATER TEMPERATURES OF 80F ENTERING, 70F LEAVING & COOLING WATER TEMPERATURES OF 82F ENTERING, 92F LEAVING.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT/BCM
DRAWN BY:	MEA/TWT
CHECKED BY:	BCM

SHEET NAME:

MECHANICAL SCHEDULE

M601

ELECTRICAL ABBREVIATIONS

1P	SINGLE POLE
1PH	SINGLE-PHASE
2/C	TWO-CONDUCTOR
2WAY	TWO-WAY
3/C	THREE-CONDUCTOR
3PH	THREE-PHASE
3WAY	THREE-WAY
4/C	FOUR-WIRE
4PDT	FOUR-POLE DOUBLE THROW
4PST	FOUR-POLE SINGLE THROW
4WAY	FOUR-WAY
4W	FOUR-WIRE
ø	PHASE
A	
A	AMPERE
AC	ALTERNATING CURRENT; ARMORED CABLE
ACT	ACOUSTIC CEILING TILE
ADA	AMERICANS WITH DISABILITIES ACT
A/E	ARCHITECT/ENGINEER
AFC	ABOVE FINISHED COUNTER
AFCI	ARC FAULT CIRCUIT INTERUPTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
ALT	ALTERNATE
AMP	AMPERE
AMT	AMOUNT
ANN	ANNUNCIATOR
APPD	APPROVED
APPROX	APPROXIMATELY; APPROXIMATE
ARCH	ARCHITECT
ASC	ABOVE SUSPENDED CEILING; AMPS SHORT CIRCUIT
ATS	AUTOMATIC TRANSFER SWITCH
ATTN	ATTENTION
AUTO	AUTOMATIC
AUX	AUXILIARY
A/V	AUDIO VISUAL
AVG	AVERAGE
AWG	AMERICAN WRE GAUGE
B	
BAS	BUILDING AUTOMATION SYSTEM
BAT	BATTERY
BFF	BELOW FINISHED FLOOR
BG	BELOW GRADE
BKBD	BACKBOARD
BLDG	BUILDING
BLT	BUILT
BLW	BELOW
BOT	BOTTOM
BPS	BOLTED PRESSURE SWITCH
BRKR	BREAKER
BSMT	BASEMENT
BTWN	BETWEEN
BX	INTERLOCKED ARMORED CABLE
BYP	BYPASS
C	
C	CELSIUS
CAT	CATALOG
CATV	COMMUNITY ANTENNA TELEVISION SYSTEM
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TV
CD	CANDELA; CONSTRUCTION DOCUMENTS;
CF	CONTRACTOR FURNISHED
CF/CI	CONTRACTOR FURNISHED/CONTRACTOR INSTALLED
CIR	CIRCLE
CKT	CIRCUIT
C	CENTERLINE
CL	CURRENT LIMITING; CENTER LINE; CLASS; CLOSE
CLG	CEILING
CLR	CLEAR
CND	CONDUIT
COAX	COAXIAL
COL	COLUMN
COMB	COMBINATION; COMBINED
COMM	COMMUNICATION
COMPR	COMPRESSOR
CONC	CONCRETE
CONN	CONNECT
CORR	CORRIDOR; CORRECT
CP	CONTROL PANEL
CR	CONTROL RELAY
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
CTR	CENTER
CTRL	CONTROL
CU	COPPER; COEFFICIENT OF UTILIZATION; CUBIC
CU FT	CUBIC FEET
CUR	CURRENT
D	
D	DEPTH
DB	DIRECT BURIAL / DECIBEL
DBL	DOUBLE
DC	DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DEL	DELETE; DELIVER
DEMO	DEMOLITION; DEMONSTRATION
DEPT	DEPARTMENT
DIA	DIAMETER
DIAG	DIAGRAM; DIAGONAL
DIFF	DIFFERENCE
DIM	DIMENSION
DISC	DISCONNECT
DIST	DISTANCE; DISTRICT
DISTR PNL	DISTRIBUTION PANEL
DIV	DIVISION; DIVIDE
DN	DOWN
DOC	DOCUMENT
DPDT	DOUBLE POLE; DOUBLE THROW
DPST	DOUBLE POLE; SINGLE THROW
DS	DISCONNECT SWITCH
DWG	DRAWING
E	
E	EAST
EA	EACH
EC	ELECTRICAL CONTRACTOR
EL	ELEVATION
ELEC	ELECTRIC
ELEV	ELEVATOR
ELR	END OF LINE RESISTOR
EM	EMERGENCY
EMI	ELECTROMAGNETIC INTERFERENCE
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENGR	ENGINEER
ENGY	ENERGY
ENT	ELECTRICAL NONMETALLIC TUBING
ENTR	ENTRANCE
EO	ELECTRICAL OUTLET
EP	ELECTRICAL PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
EST	ESTIMATE
ESTB	ESTABLISH
EX	EXISTING
EXH	EXHAUST
EXP	EXPANSION; EXPOSED; EXPAND
EXT	EXTERIOR; EXTERNAL
EXTN	EXTENSION
F	
F	FAHRENHEIT; FEMALE
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OWNER
FC	FOOT-CANDLE
FCU	FAN COIL UNIT
FDR	FEEDER
FIN	FINISH
FIN GR	FINISH GRADE
FIXT	FIXTURE
FL MT	FLUSH MOUNT
FLEX	FLEXIBLE
FLG	FLOORING
FLR	FLOOR
FLUOR	FLUORESCENT
FM	FREQUENCY MODULATION
FP	FIREPROOF
FR	FIRE RESISTANT
FREQ	FREQUENCY
FS	FUSIBLE SWITCH; FLOW SWITCH
FSC	FOOD SERVICE EQUIPMENT CONTRACTOR
FT	FEET; FIRE TREATED; FOOT
FU	FUSE
FU SW	FUSED SWITCH
FURN	FURNISH; FURNACE; FURNITURE
FUT	FUTURE
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
G	
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERAL; GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GOVT	GOVERNMENT
GRN	GROUND
GYP	GYPSUM
H	
HDW	HARDWARE
HF	HIGH FREQUENCY
HID	HIGH INTENSITY DISCHARGE
HO	HOLD OPEN
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HOSP	HOSPITAL
HP	HORSEPOWER; HEAT PUMP; HIGH PRESSURE
HPS	HIGH PRESSURE SODIUM
HT	HEIGHT
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HZ	HERTZ; FREQUENCY IN CYCLES PER SECOND
I	
ID	INSIDE DIAMTER; INSIDE DIMENSION; IDENTIFICATION
ILLUM	ILLUMINATION
IMC	INTERMEDIATE METAL CONDUIT
INFO	INFORMATION
INSUL	INSULATION
INTERCOM	INTERCOMMUNICATION
INTL	INTERNATIONAL
IR	INFRARED; INSIDE RADIUS
IT	INFORMATION TECHNOLOGY
J	
JB	JUNCTION BOX
K	
KCMIL	THOUSAND CIRCULAR MILS
KHz	KILOHERTZ
KIT	KITCHEN
KO	KNOCKOUT
kV	KILOVOLT
kVA	KILOVOLT AMPERES
kVAh	KILOVOLT AMPERE PER HOUR
kVAR	KILOVAR; KILOVOLT AMPERE REACTIVE
kW	KILOWAT
kWh	KILOWATT HOURS
L	
L	LITER; ANGLE
LA	LIGHTNING ARRESTER
LAN	LOCAL AREA NETWORK
LED	LIGHT EMITTING DIODE
LF	LINEAR FEET (FOOT)
LIN	LINEAR
LM	LUMEN
LOC	LOCATION
LP	LIGHT POLE; LOW PRESSURE
LPW	LUMENS PER WATT
LT	LIGHT
LT SW	LIGHT SWITCH
LTD	LIMITED
LTG	LIGHTING
LV	LOW VOLTAGE
M	
M	METER
mA	MILLIAMPERE
MACH	MACHINE
MAG	MAGNET
MAINT	MAINTENANCE
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMIM
MC	MECHANICAL CONTRACTOR; METAL CLAD CABLE
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MDP	MAIN DISTRIBUTION PANEL
MDS	MAIN DISTRIBUTION SWITCHBOARD
ME	MECHANICAL ENGINEER
MECH	MECHANICAL
MED	MEDICAL; MEDIUM
MFD	MANUFACTURED
MFR	MANUFACTURER
MFR REC	MANUFACTURER'S RECOMMENDATION
MH	MANHOLE; METAL HALIDE
MHZ	MEGAHERTZ
MI	MINERAL INSULATED
MIC	MICROPHONE
MID	MIDDLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MOA	MULTIOUTLET ASSEMBLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MOD	MODIFY; MODULE
MON	MONITOR
MOT	MOTOR
MOV	MOTOR OPERATED VALVE
MS	MOTOR STARTER
MTD	MOUNTED
MTG	MEETING; MOUNTING
MTL	METAL
MTS	MANUAL TRANSFER SWITCH
MULT	MULTIPLE
mV	MILLIVOLT
MVA	MEGAVOLT-AMPERE
MW	MEGAWATT; MICROWAVE
mW	MILLIWATT
MWH	MEGAWATT HOUR
N	
N	NORTH
NC	NORMALLY CLOSED
NE	NORMAL EMERGENCY
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEUT	NEUTRAL
NF	NON-FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NFS	NON-FUSED SWITCH
NIC	NOT IN CONTRACT
NM	NONMETALLIC
NMAG	NONMAGNETIC
NO	NORMALLY OPEN; NUMBER
NORM	NORMAL
NTS	NOT TO SCALE
O	
OA	OVERALL; OUTSIDE AIR
OC	ON CENTER
OCC	OCCUPANCY
OCPD	OVERCURRENT PROTECTION DEVICE
OD	OUTSIDE DIAMETER; OUTSIDE DIMENSION
OF/CI	OWNER FURNISHED / CONTRACTOR INSTALLED
OF/OI	OWNER FURNISHED / OWNER INSTALLED
OH	OVERHEAD
OL	OVERLOAD ELEMENT
OPP	OPPOSITE
OPT	OPTIONAL; OPTIMUM
OVC	OVERCURRENT
P	
P	POLE (S); PILOT
PA	POWER AMPLIFIER; PUBLIC ADDRESS
PART	PARTIAL
PB	PULL BOX; PANEL BOARD; PANIC BAR; PUSH-BUTTON
PC	PLUMBING CONTRACTOR; PIECE
PE	PHOTOELECTRIC, PNEUMATIC ELECTRIC
PEN	PENETRATE
PERF	PERFORATED
PERIM	PERIMETER
PERM	PERMANENT
PF	POWER FACTOR
PH	PHASE
PIV	POST INDICATOR VALVE
PL	PILOT LIGHT
PLBG	PLUMBING
PNL	PANEL
POS	POSITION; POSITIVE
PP	POWER POLE
PR	PAIR
PRELIM	PRELIMINARY
PREP	PREPARATION
PRESS SW	PRESSURE SWITCH
PREV	PREVIOUS
PRI	PRIMARY
PROJ	PROJECT
PS	PULL STATION
PT	POTENTIAL TRANSFORMER
PVC	POLYVINAL CHLORIDE (PLASTIC)
PWR	POWER
Q	
QA	QUALITY ASSURANCE
QC	QUALITY CONTROL
QTY	QUANTITY
QUAL	QUALITY
R	
R	RELAY; RADIUS
R/W	RIGHT OF WAY
RC	REMOTE CONTROL
RCP	REFLECTED CEILING PLAN
REC	RECESSED
RCPT	RECEPTACLE
REF	REFRIGERATOR; REFERENCE
REINF	REINFORCED
REPL	REPLACE
REQD	REQUIRED
REV	REVISION; REVOLUTIONS
RFI	REQUEST FOR INFORMATION
RFP	REQUEST FOR PROPOSAL
RH	RIGHT HAND
RHC	REHEAT COIL
ROW	RIGHT OF WAY
RS	RAPID START
RTG	RATING
RTU	ROOF TOP UNIT
S	
S/S	START / STOP
SAMP	SAMPLE
SCHED	SCHEDULE
SCHEM	SCHEMATIC
SD	SMOKE DETECTOR
SDMPR	SMOKE DAMPER
SEC	SECONDARY
SECT	SECTION
SEP	SEPARATE
SHT	SHEET
SIM	SIMILAR
SLV	SLEEVE
SMR	SURFACE MOUNTED RACEWAY
SNSR	SENSOR
SOLV	SOLENOID VALVE
SPDT	SINGLE POLE; DOUBLE THROW
SPEC	SPECIFICATION
SPKR	SPEAKER
SPLY	SUPPLY
SPST	SINGLE POLE; SINGLE THROW
SQ	SQUARE
SS	STAINLESS STEEL
ST	SINGLE THROW; STAIRS; STREET
ST PR	STATIC PRESSURE
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE
STR	STARTER; STRAIGHT; STRIKE; STRINGERS
STRB	STROBE
STRB/HRN	STROBE / HORN
STRUCT	STRUCTURAL
SUB	SUBSTITUTE
SUP	SUPPLEMENTARY
SUPVR	SUPERVISOR
SURF	SURFACE
SUSP	SUSPEND
SW	SWITCH; SIDEWALK
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMBOL
SYS	SYSTEM
T	
T&M	TIME AND MATERIAL
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPORARY
TERM	TERMINAL
THRU	THROUGH
TL	TWIST LOCK
TOC	TOP OF CONCRETE; TOP OF CURB
TOL	TOLERANCE
TP	TWISTED PAIR; TELEPHONE POLE
TSP	TWISTED SHIELDED PAIR
TSTAT	THERMOSTAT
TV	TELEVISION
TVOUT	TELEVISION OUTLET
TYP	TYPICAL
U	
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UP	UTILITY POLE
UPS	UNINTERRUPTIBLE POWER SUPPLY
UL	UNDER WRITERS LABORATORIES
UTP	UNSHIELDED TWITED PAIR
UTIL	UTILITY
UV	UNIT VENTILATOR; ULTRAVIOLET
V	
V	VOLT
VA	VOLT AMPERE
VAM	VOLTAMMETER
VAR	VARIATION; VARIES; VOLT AMPERE REACTIVE
VD	VOLTAGE DROP; VOLUME DAMPER
VERT	VERTICAL
VF	VARIABLE FREQUENCY
VFD	VARIABLE FREQUENCY DRIVE
VID	VIDEO
VIF	VERIFY IN FIELD
VOLT	VOLTAGE
VR	VOLTAGE REGULATOR; VAPOR RETARDED
VRFY	VERIFY
VRLY	VOLTAGE RELAY
VS	VOLTMETER SWITCH; VENT STACK
W	
W	WIRE; WATT; WASTE; WEST; WIDE
W/	WITH
W/O	WITHOUT
WHM	WATTHOUR METER
WP	WEATHERPROOF; WATER PUMP; WATER HEATER
WR	WEATHER RESISTANT; WATER REPELLENT
WW	WIREWAY; WARM WHITE; WASTE WATER
X	
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

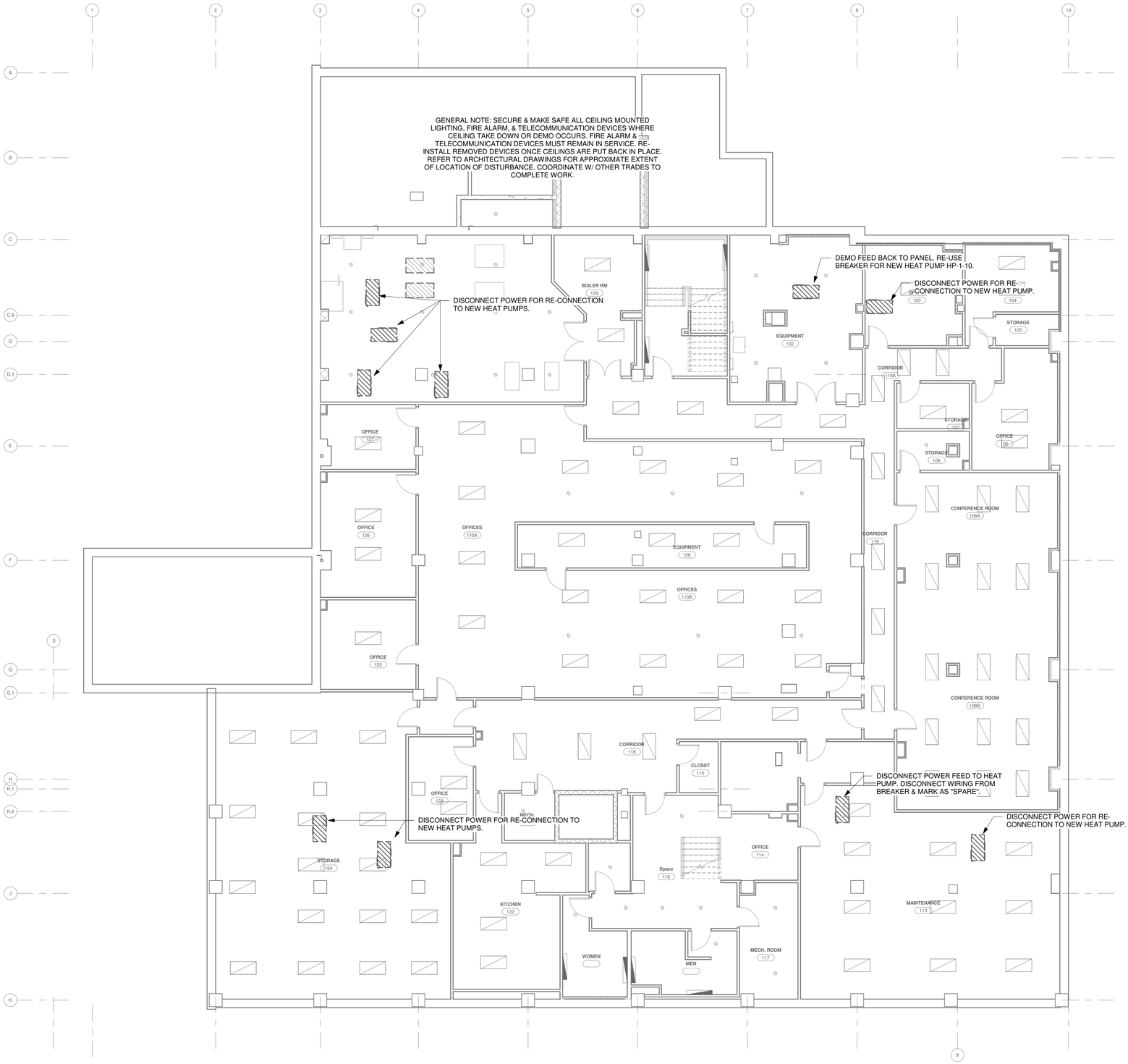
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL ABBREVIATIONS

E000



LEVEL 1 ELECTRICAL DEMO PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CAMMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

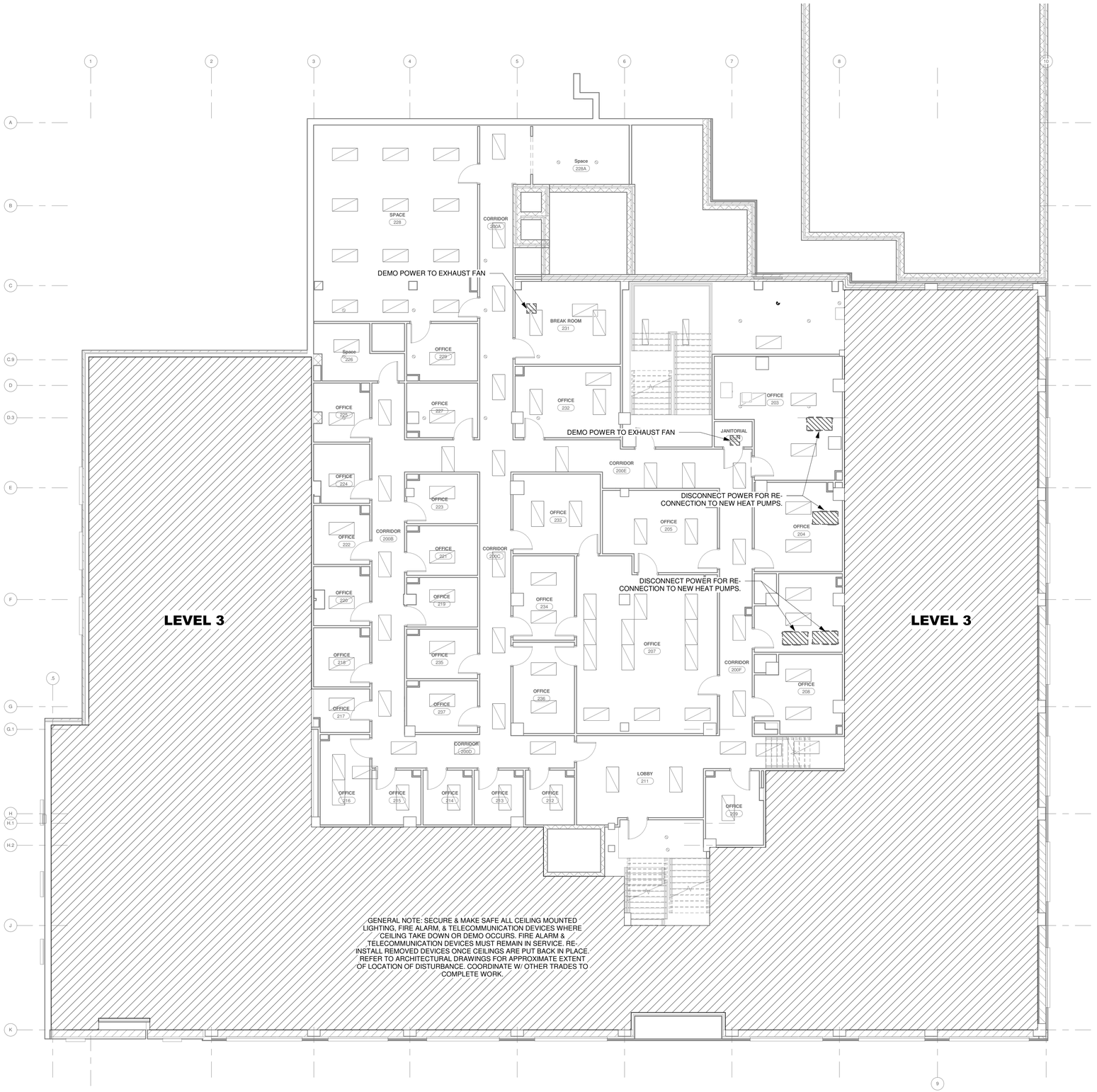
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

DEMO ELECTRICAL PLAN

E001



LEVEL 2 ELECTRICAL DEMO PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE, MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATTITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

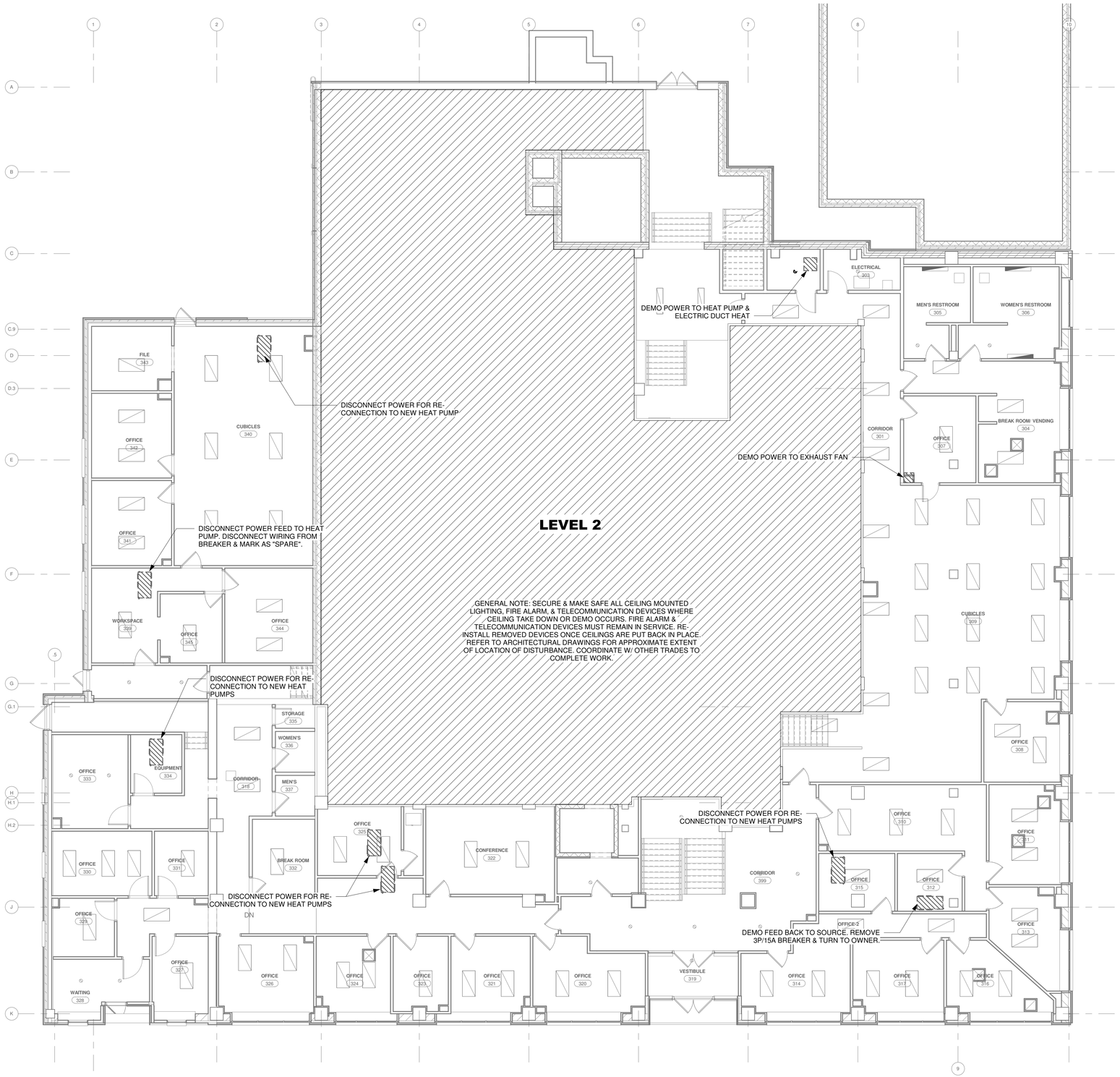
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

DEMO ELECTRICAL PLAN

E002



LEVEL 3 ELECTRICAL DEMO PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE, MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

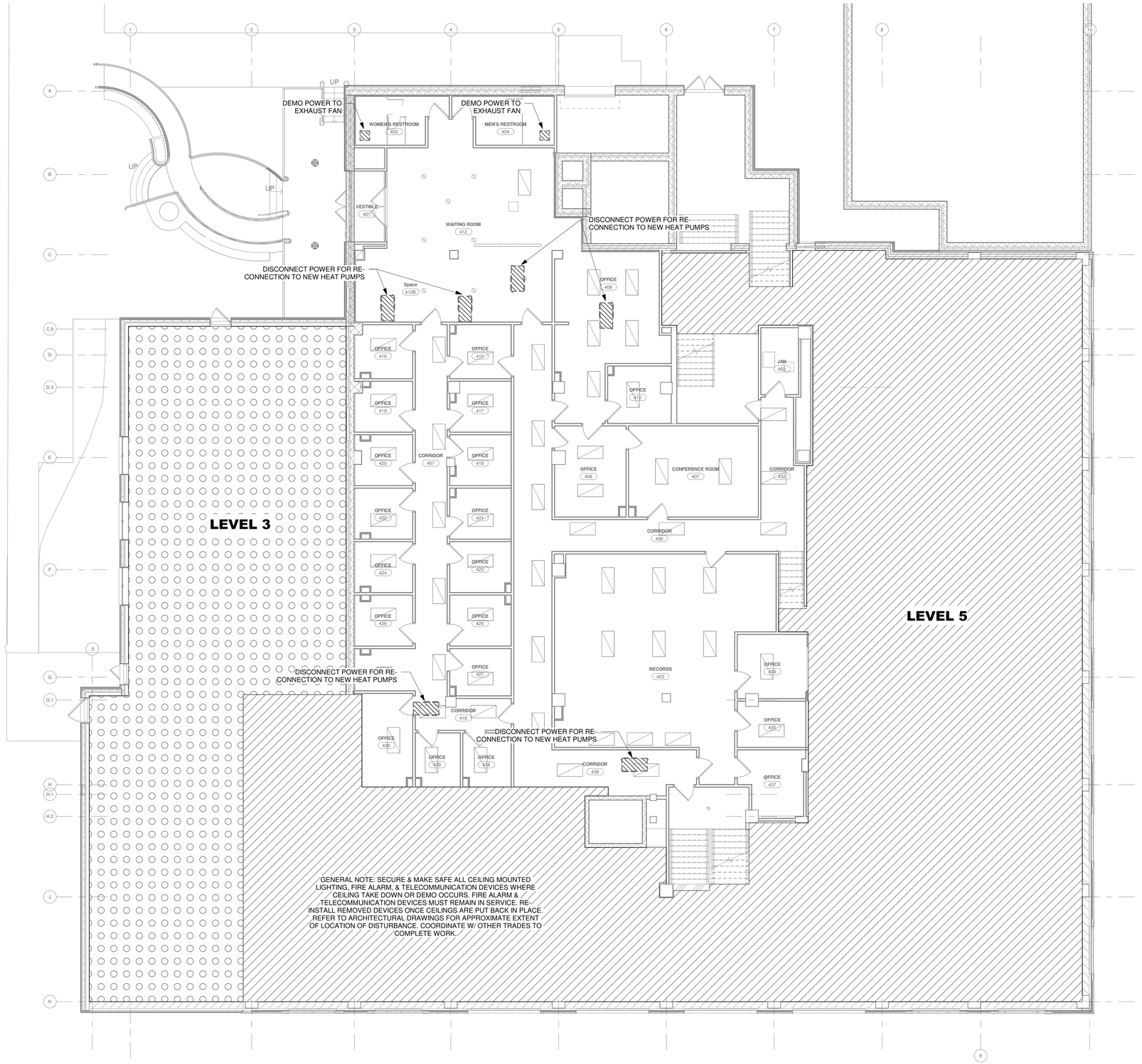
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

DEMO ELECTRICAL PLAN

E003



LEVEL 4 ELECTRICAL DEMO PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
BRIAN C. MILLER
REGISTERED
15184
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT NAME:
WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:
WEST VIRGINIA GENERAL SERVICES DIVISION

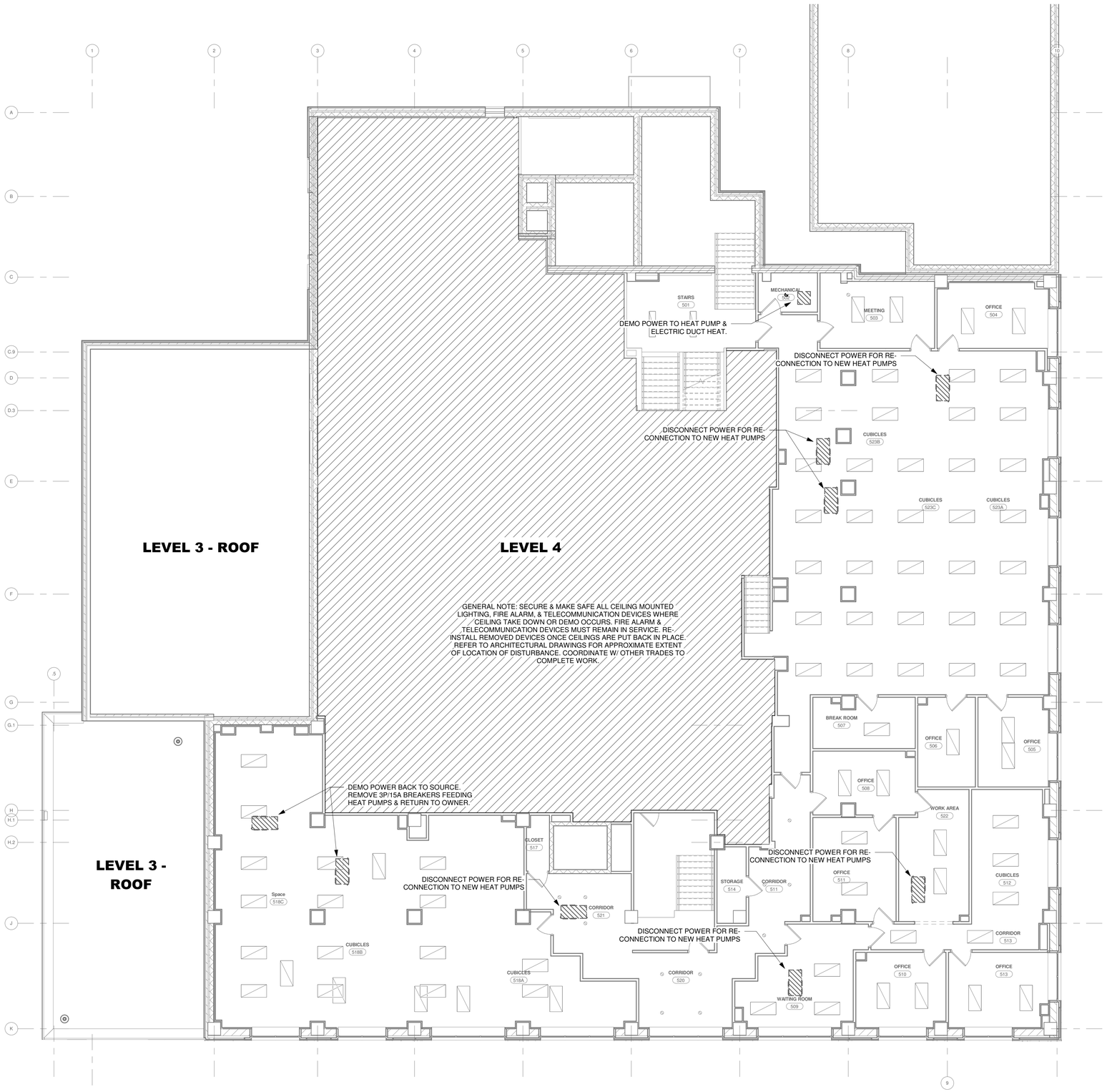
PROJECT STATUS:
CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:
DEMO ELECTRICAL PLAN

E004



LEVEL 5 ELECTRICAL DEMO PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

DEMO ELECTRICAL PLAN

E005

LEVEL 1 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE, MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

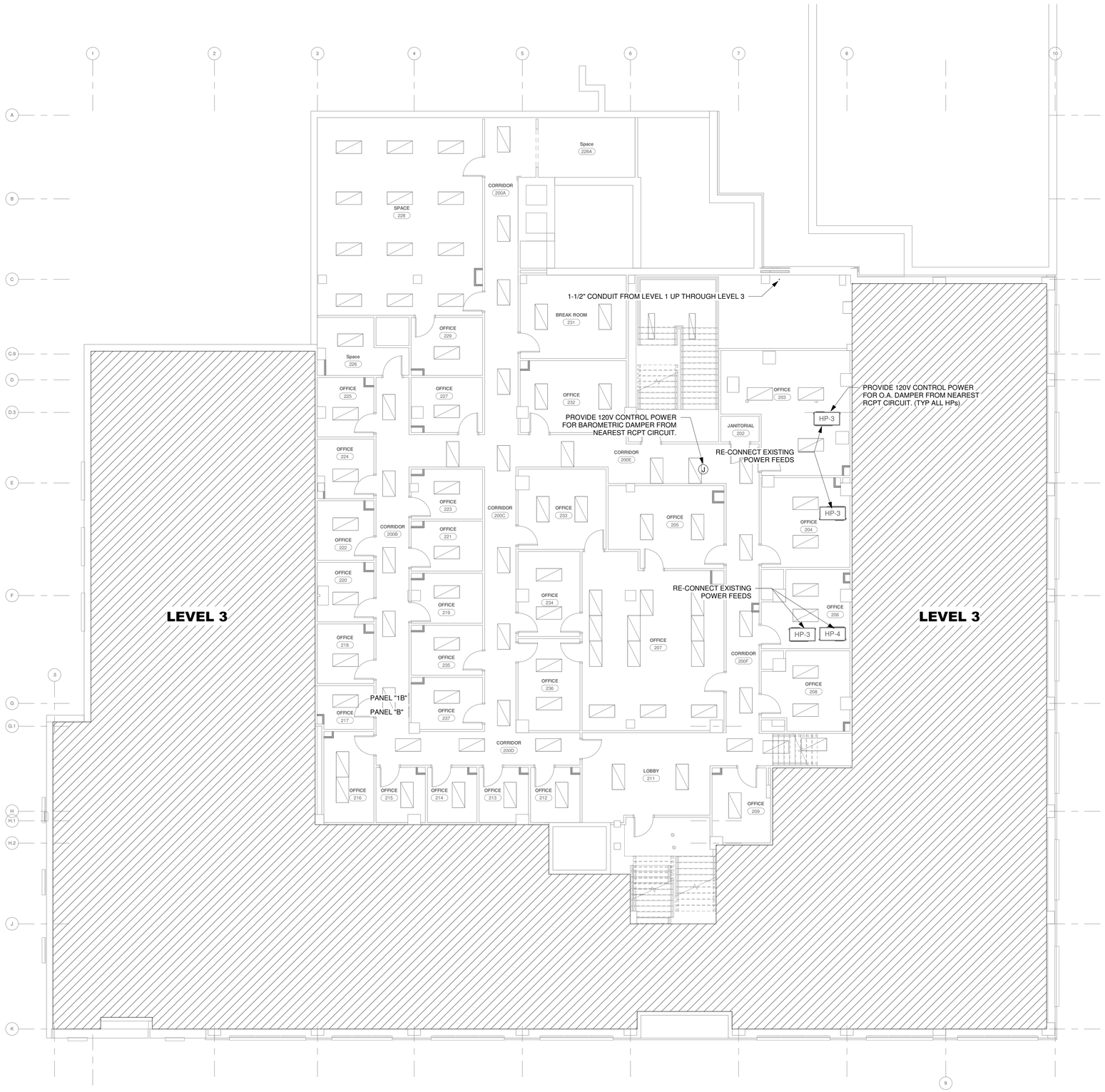
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E101



LEVEL 2 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
BRIAN C. MILLER
REGISTERED
15184
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

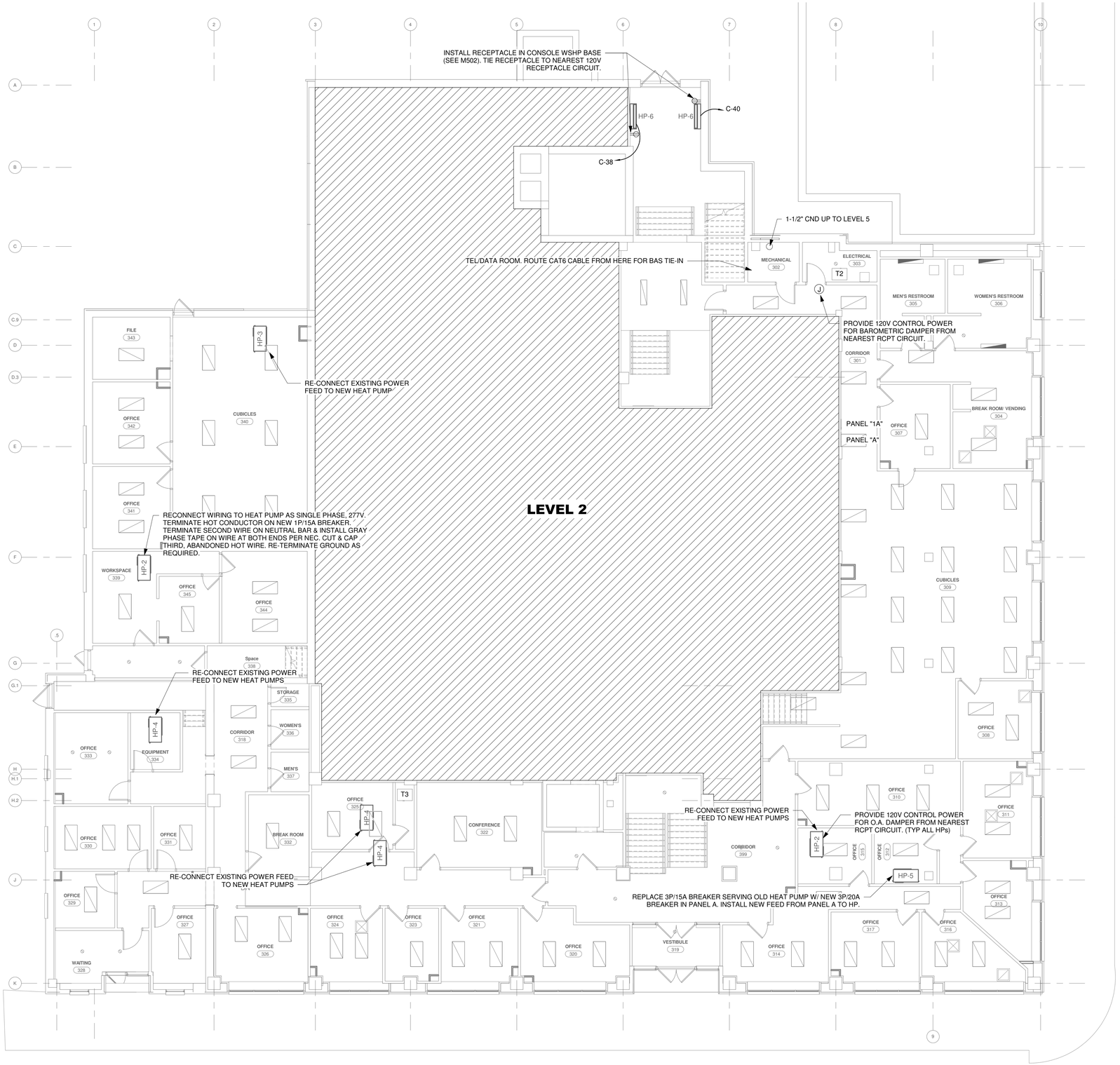
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E102



LEVEL 3 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:
JOSEPH W. MILLER
REGISTERED
15184
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

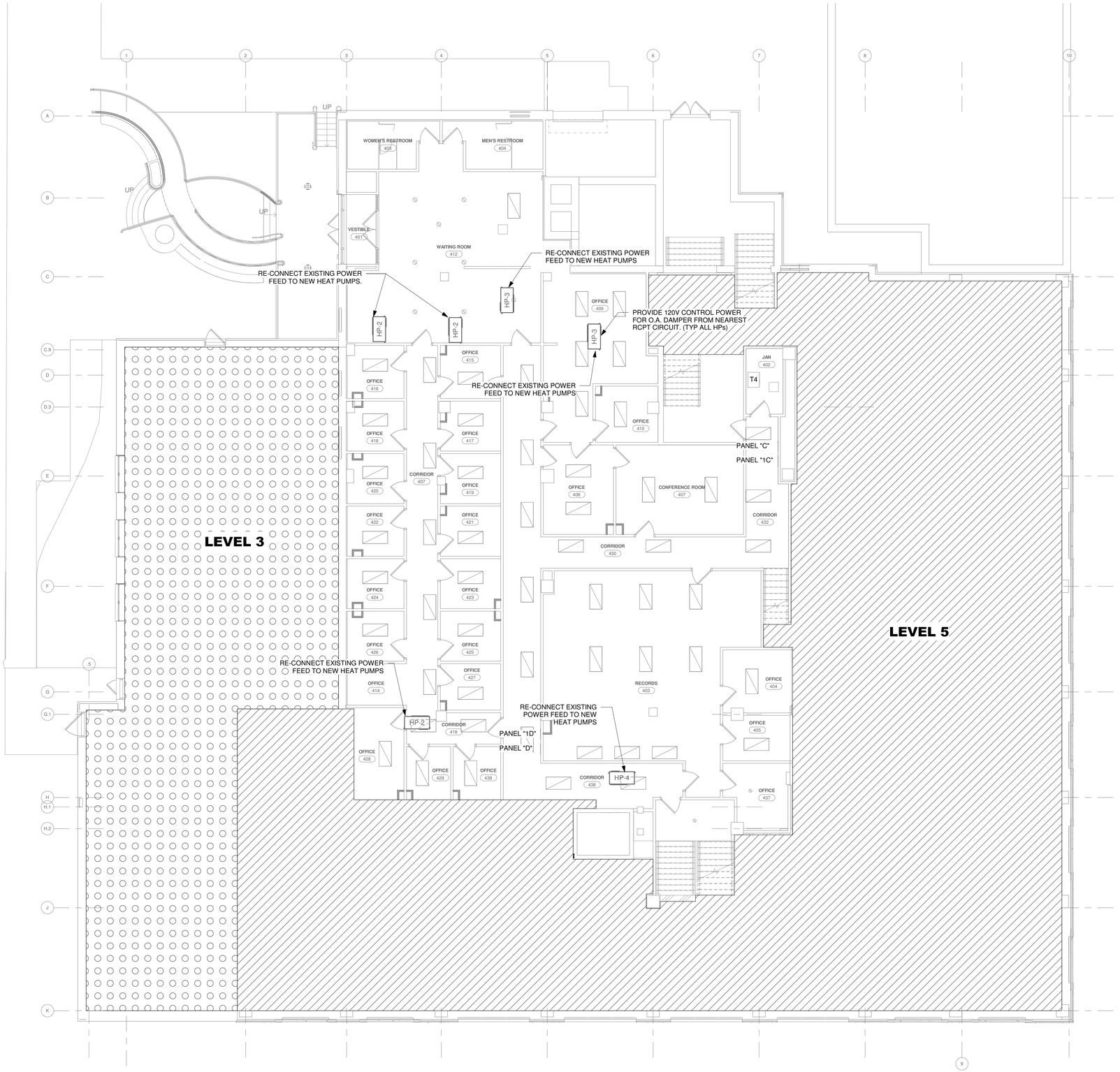
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E103



LEVEL 4 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

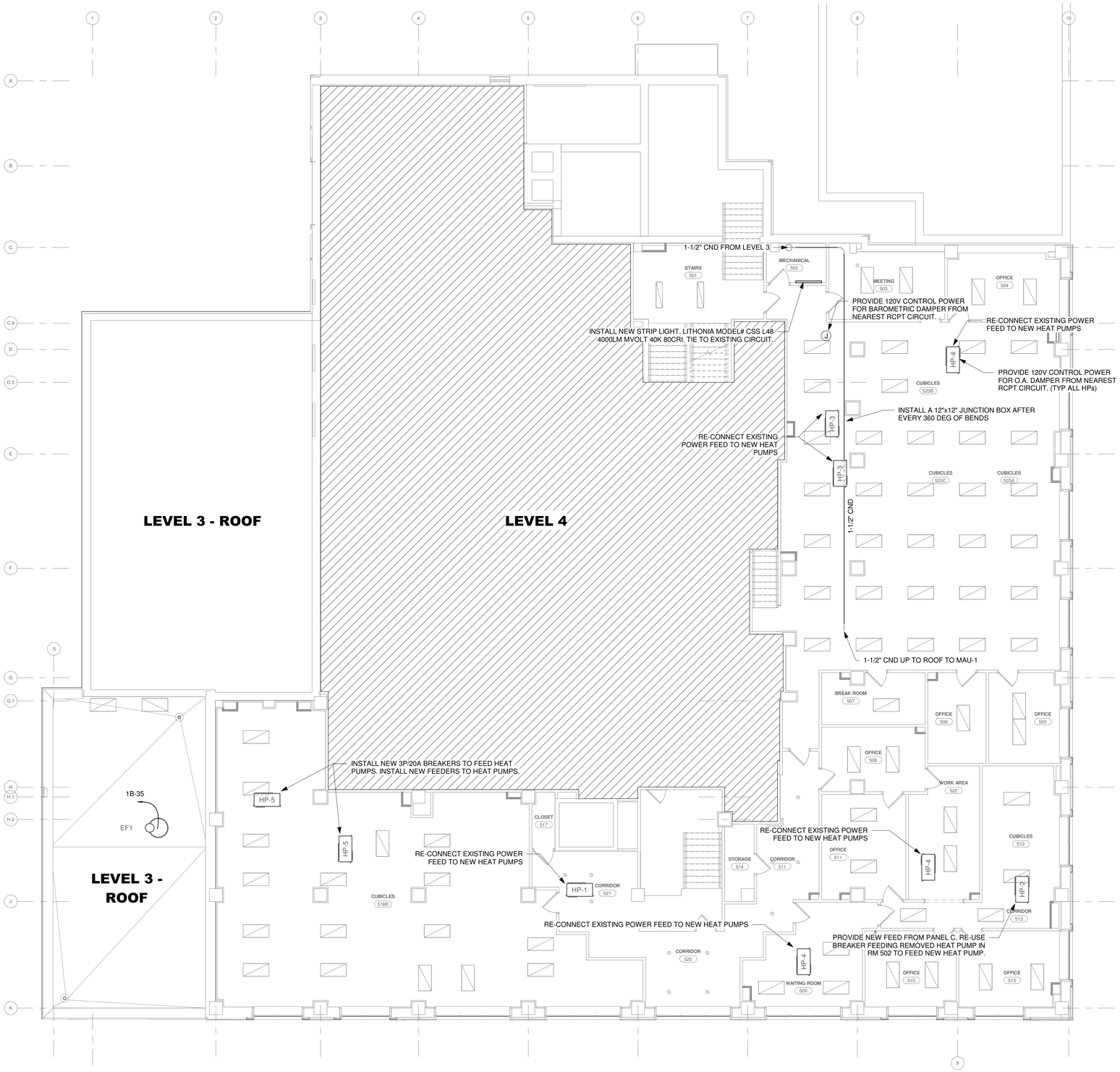
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E104



LEVEL 5 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE, MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

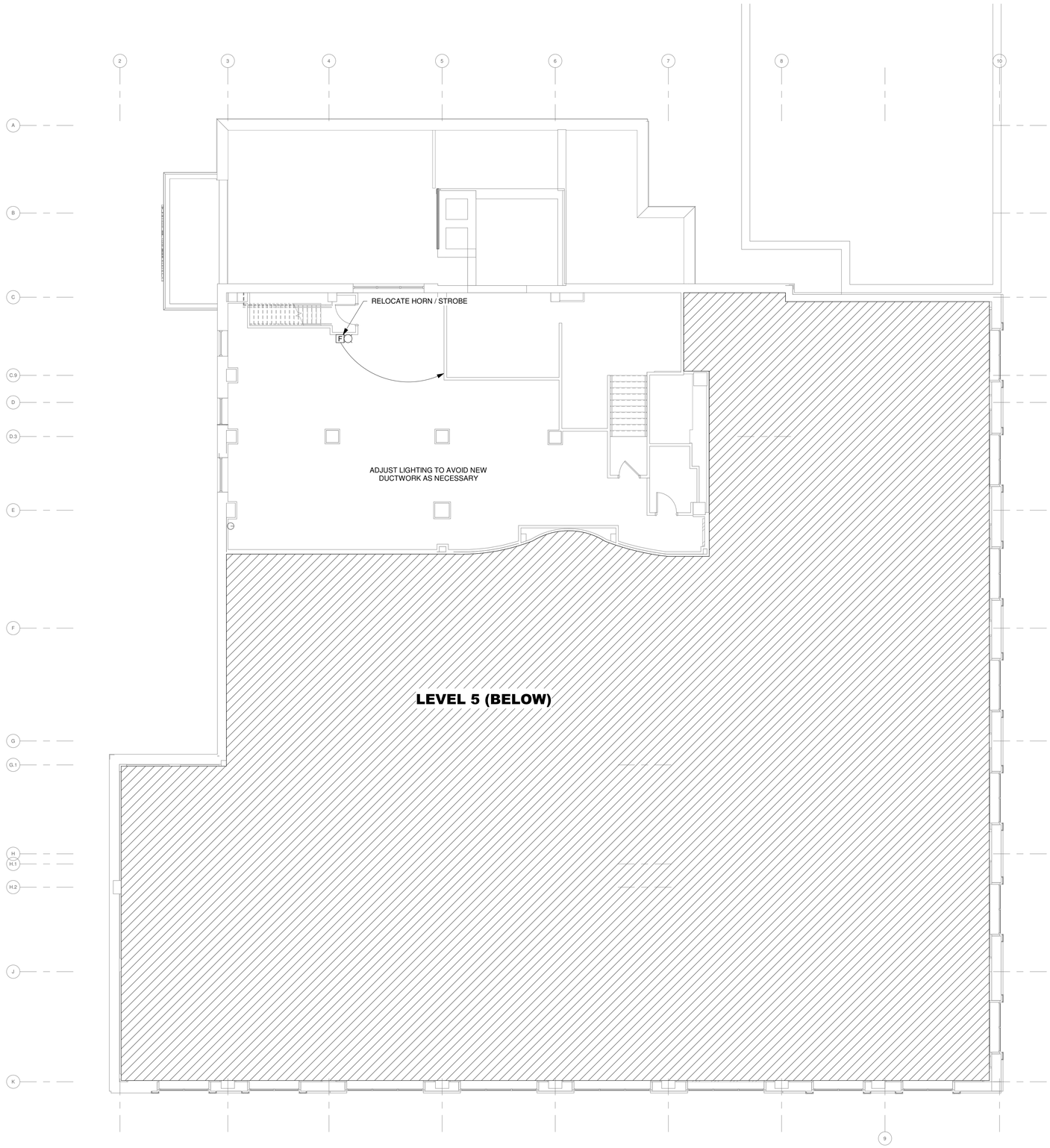
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E105



LEVEL 6 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATITLE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT6A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

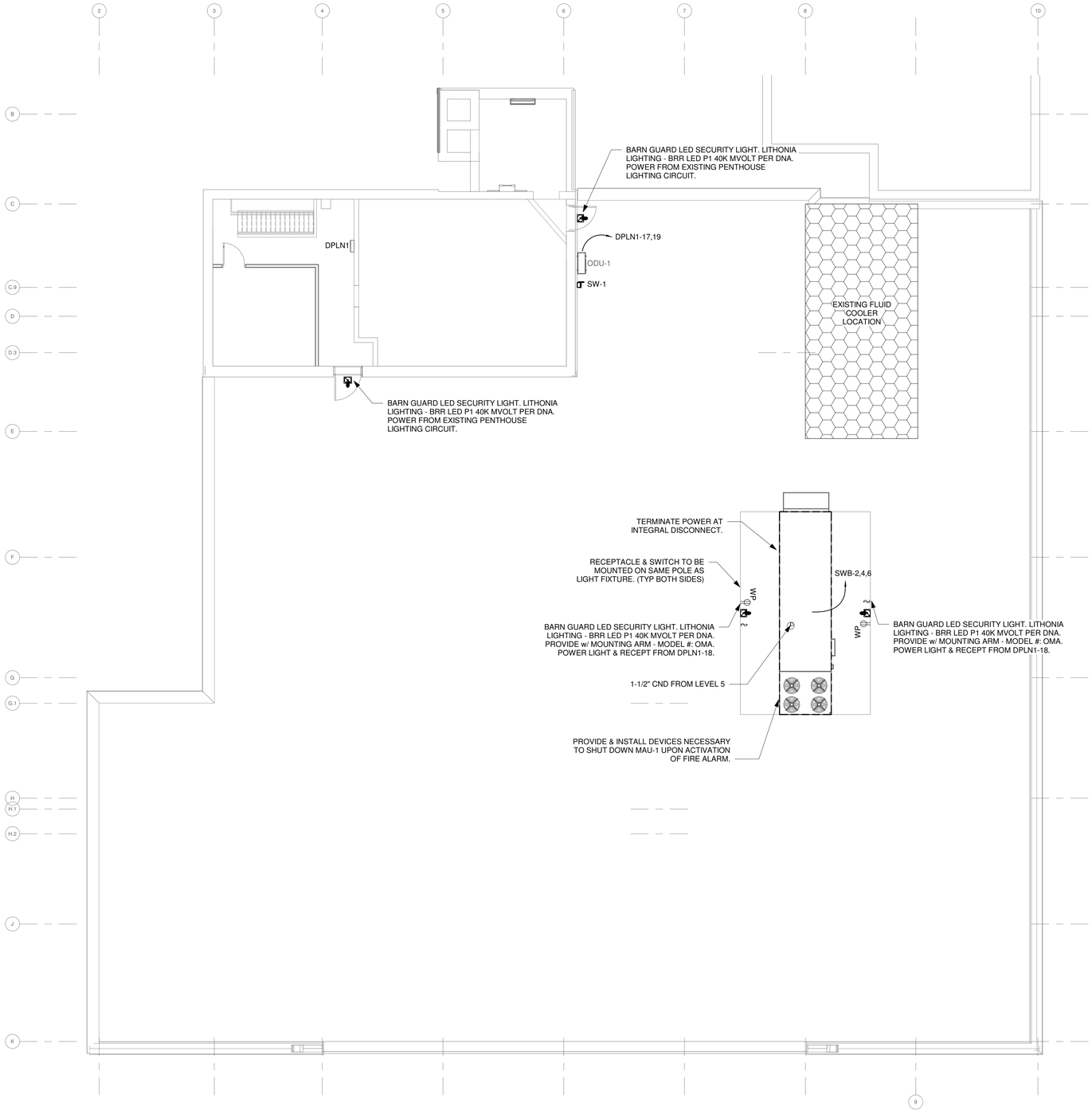
NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E106



LEVEL 7 ELECTRICAL PLAN

1/8" = 1'-0"

ELECTRICAL NOTES

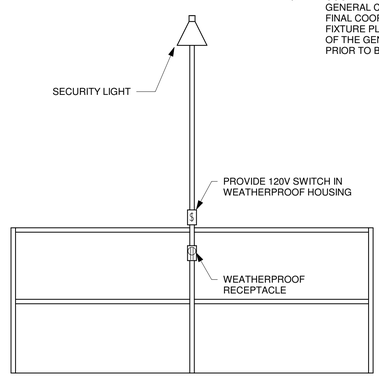
1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY. ARCH.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED FOR ALL OUTLETS AND DEVICES. FOLLOW INDICATED CIRCUITS NUMBERS AND PANEL DESIGNATION. OBTAIN PRIOR APPROVAL OF ENGINEER FOR DEVIATIONS.
3. ALTHOUGH ALL BRANCH CIRCUIT WIRING IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. ALL NEUTRALS SHALL BE FULL CAPACITY. THE USE OF SHARED OR COMMON NEUTRALS IS PROHIBITED ON ALL ELECTRIC WIRING.
4. PROVIDE CONTROL AND FIRE ALARM WIRE AS NECESSARY TO INSTALL ALL SYSTEMS DEVICES AND PANELS FOR COMPLETE SYSTEMS. FINAL CONNECTION TO PERMANENTLY MOUNTED EQUIPMENT IS PART OF THE ELECTRICAL SCOPE OF THIS PROJECT.
5. PROVIDE TEL/DATA AND CAT6 AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS WITH OWNER PRIOR TO INSTALLATION.
6. ALL INTERIOR WIRING SHALL BE THHN/THWN IN METAL CONDUIT OR MC CABLE. MAX OF 3'-0" OF FLEXIBLE CONDUIT MAY BE USED FOR FINAL EQUIPMENT TERMINATIONS.
7. EXTERIOR WIRING IS TO BE THHN/THWN IN PVC CONDUIT. MAX. OF 3'-0" OF FLEXIBLE METALLIC SEATTILE CONDUIT MAY BE USED TO EXTERIOR EQUIPMENT.
8. TV AND TELEPHONE CABLING SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION. COORDINATE FINAL DEMARC LOCATIONS w/ TV AND TELEPHONE COMPANY.
9. GROUP AND TRAIN ALL TEL/DATA AND CABLE TV CABLE. SUPPORT FROM STRUCTURE.
10. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK WITH OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
11. PERFORM ALL WORK IN ACCORDANCE WITH 2017 NEC.
12. COORDINATE FINAL FIXTURE LOCATIONS WITH OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK , DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.

FIRE ALARM NOTES

1. PROVIDE FIRE ALARM WIRING AND CONDUIT AS NECESSARY TO MEET CODES, STANDARDS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ).
2. PROVIDE WIRING AND CONDUIT AS NECESSARY TO INSTALL ALL FIRE ALARM DEVICES AND PANELS FOR A COMPLETE SYSTEM.
3. PROVIDE SYSTEM DETECTION & SIGNALING CABLING, RELAYS, & MATERIALS TO INTERFACE TO FIRE & SMOKE DAMPERS IN RELIEF & OUTSIDE AIR DUCTS. MECH CONTRACTOR TO PROVIDE & INSTALL DAMPERS & OPERATORS. FA CONTRACTOR TO MAKE THEM OPERABLE. COORDINATE PRIOR TO BIDDING.
4. FIRE ALARM WIRING IS TO BE IN CONDUIT OR MC CABLE APPROPRIATELY LABELED AS REQUIRED BY NFPA 72.
5. PERFORM ALL WORK IN ACCORDANCE w/ NFPA 72 AND 2017 NEC.
6. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTING, ETC IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.

COMMUNICATION NOTES

1. TELE/DATA CONDUIT IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. ALL WALL MOUNTED DEVICES ARE FINAL HEIGHT BY ARCHITECT.
2. PROVIDE TELE/DATA RACEWAY & CAT5A CABLING AS INDICATED. REVIEW DATA, SWITCH, RECEPTACLE, ETC LOCATIONS AND HEIGHTS w/ OWNER PRIOR TO INSTALLATION.
3. RACEWAY SHALL BE INSTALLED FROM LOCATIONS INDICATED ON DRAWINGS TO DEMARC LOCATION.
4. VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS PRIOR TO BIDDING. COORDINATE ALL WORK w/ OTHER TRADES. COORDINATE ALL CEILING MOUNTED DEVICES w/ ALL OTHER TRADES PRIOR TO INSTALLATION.
5. PERFORM ALL WORK IN ACCORDANCE 2017 NEC.
6. COORDINATION OF FINAL FIXTURE LOCATION w/ OWNER AND GENERAL CONTRACTOR PRIOR TO INSTALLATION OF CEILING. FINAL COORDINATION OF SCOPE OF WORK, DIMENSIONS, FIXTURE PLACEMENT, ROUTINGS, ETC. IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS PRIOR TO BIDDING.



(2) MAU LIGHTING DETAIL

DRAWING NOT SCALABLE

REVIEW SHEET A301 FOR SECTION DRAWING SHOWING RELATIVE ELEVATIONS OF EACH LEVEL.

MILLER ENGINEERING, INC.
WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234
PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER:	19013
ORIGINAL PAGE SIZE:	24x36
DESIGNED BY:	TWT
DRAWN BY:	TWT
CHECKED BY:	BCM

SHEET NAME:

ELECTRICAL PLAN

E107

Existing Panel: SWB

VOLTS: 480/277 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 1600 A
MAIN TYPE: MCB

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
SWB-1							SWB-2
SWB-3	DPHN1	100 A	3	3	110 A	MAU-1(1)	SWB-4
SWB-5							SWB-6
SWB-7				--	--	MAU-1 SHUNT TRIP (1)	SWB-8
SWB-9							SWB-10
SWB-11							SWB-12
SWB-13							SWB-14
SWB-15							SWB-16
SWB-17							SWB-18
SWB-19							SWB-20
SWB-21	PANEL A	225 A	3				SWB-22
SWB-23							SWB-24
SWB-25							SWB-26
SWB-27	PANEL B	225 A	3				SWB-28
SWB-29							SWB-30
SWB-31							SWB-32
SWB-33	PANEL C	225 A	3	3	100 A	COOLING TOWER	SWB-34
SWB-35							SWB-36
SWB-37							SWB-38
SWB-39				3	70 A	FREIGHT ELEVATOR	SWB-40
SWB-41							SWB-42
SWB-43							SWB-44
SWB-45				3	45 A	NEW ELEVATOR	SWB-46
SWB-47							SWB-48
SWB-49							SWB-50
SWB-51	PANEL D	225 A	3	3	100 A	EXISTING LOAD	SWB-52
SWB-53							SWB-54
SWB-55							SWB-56
SWB-57	PANEL E	225 A	3				SWB-58
SWB-59							SWB-60
SWB-61							SWB-62
SWB-63	PANEL F	225 A	3				SWB-64
SWB-65							SWB-66
SWB-67							SWB-68
SWB-69							SWB-70
SWB-71							SWB-72
SWB-73							SWB-74
SWB-75							SWB-76
SWB-77							SWB-78
SWB-79							SWB-80
SWB-81							SWB-82
SWB-83							SWB-84

Notes: (1) NEW BREAKER

Existing Panel: DPLN1

VOLTS: 120/208 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 100 A
MAIN TYPE: MCB

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
DPLN1-1	RCP-601	20 A	1	1	20 A	RCP-601	DPLN1-2
DPLN1-3	RCP-601	20 A	1	1	20 A	RCP-601	DPLN1-4
DPLN1-5	RCP-601	20 A	1	1	20 A	RCP-601	DPLN1-6
DPLN1-7	RCP-601	20 A	1	1	20 A	RCP-602	DPLN1-8
DPLN1-9	RCP-603	20 A	1	1	20 A	ERV-1	DPLN1-10
DPLN1-11	B1	20 A	1				DPLN1-12
DPLN1-13	BIZ HUB	20 A	1	3	20 A	P-1	DPLN1-14
DPLN1-15	BIZ HUB	20 A	1				DPLN1-16
DPLN1-17	ODU-1 (1)	25 A	2	1	20 A	MAU-1 LIGHT & RECPT	DPLN1-18
DPLN1-19							DPLN1-20
DPLN1-21							DPLN1-22
DPLN1-23							DPLN1-24
DPLN1-25							DPLN1-26
DPLN1-27							DPLN1-28
DPLN1-29							DPLN1-30
DPLN1-31							DPLN1-32
DPLN1-33							DPLN1-34
DPLN1-35							DPLN1-36
DPLN1-37							DPLN1-38
DPLN1-39							DPLN1-40
DPLN1-41							DPLN1-42

Notes:(1) NEW BREAKER

ExistingPanel: A

VOLTS: 480/277 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 225 A
MAIN TYPE: MLO

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
A-1	EM LTG	20 A	1	1	20 A	LTG 306,307,310	A-2
A-3	LTG 203,209,232,237	20 A	1	1	20 A	LTG 311,321	A-4
A-5	LTG 203,209,232,237	20 A	1	1	20 A	LTG 311,321	A-6
A-7	LTG 203,209,232,237	20 A	1				A-8
A-9				3	20 A	DUCT HEATER 302	A-10
A-11	HEAT PUMP 302 CLOSET	15 A	3				A-12
A-13							A-14
A-15				3	15 A	HEAT PUMP CLOSET 4TH	A-16
A-17	HEAT PUMP 204	15 A	3				A-18
A-19							A-20
A-21				3	15 A	HEAT PUMP 206B	A-22
A-23	HEAT PUMP 206A	15 A	3				A-24
A-25							A-26
A-27				3	15 A	HEAT PUMP 315	A-28
A-29	HEAT PUMP 312 REHAB(1)	20 A	3				A-30
A-31				1	20 A	EXISTING LOAD	A-32
A-33	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	A-34
A-35	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	A-36
A-37							A-38
A-39	T-2	70 A	3				A-40
A-41							A-42

Notes:(1) NEW BREAKER

Existing Panel: B

VOLTS: 480/277 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 225 A
MAIN TYPE: MLO

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
B-1	EM LTG 2ND AND 3RD	20 A	1	1	20 A	LTG 219-238	B-2
B-3	LTG 3RD LEVEL	20 A	1	1	20 A	LTG 219-238	B-4
B-5	LTG 3RD LEVEL	20 A	1	1	20 A	LTG 219-238	B-6
B-7	LTG 3RD LEVEL	20 A	1	1	20 A	LTG 219-238	B-8
B-9							B-10
B-11	HEAT PUMP 340	15 A	3	3	15 A	SPARE (2)	B-12
B-13							B-14
B-15							B-16
B-17	HEAT PUMP 334	15 A	3	3	15 A	HEAT PUMP 325B	B-18
B-19							B-20
B-21				1	20 A	EXISTING LOAD	B-22
B-23	HEAT PUMP 325A	15 A	3	1	20 A	EXISTING LOAD	B-24
B-25				1	20 A	HEAT PUMP 339 (1)	B-26
B-27	EXISTING LOAD	20 A	1				B-28
B-29							B-30
B-31	T3	70 A	3				B-32
B-33							B-34
B-35							B-36
B-37	CEILING HEATER 323	15 A	3				B-38
B-39							B-40
B-41							B-42

Notes:(1) NEW BREAKER (2) RE-LABEL PREVIOUS BREAKER SERVING HEAT PUMP.

Existing Panel: D

VOLTS: 480/277 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 225 A
MAIN TYPE: MLO

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
D-1	EM LTG	20 A	1	1	20 A	LTG - 408-426	D-2
D-3	LTG - 523	20 A	1	1	20 A	LTG - 408,426	D-4
D-5	LTG - 523	20 A	1	1	20 A	EXISTING LOAD	D-6
D-7	LTG - 523	20 A	1				D-8
D-9				3	15 A	HEAT PUMP 427	D-10
D-11	HEAT PUMP 412C	15 A	3				D-12
D-13							D-14
D-15				3	15 A	HEAT PUMP 409	D-16
D-17	HEAT PUMP 429	15 A	3				D-18
D-19							D-20
D-21				3	15 A	HEAT PUMP 412A	D-22
D-23	HEAT PUMP IN FRONT OF ELEV	15 A	3				D-24
D-25							D-26
D-27				3	15 A	HEAT PUMP 412B	D-28
D-29	CEILING HEATER 401	15 A	3				D-30
D-31							D-32
D-33	EXISTING LOAD	20 A	1	3	15 A	HEAT PUMP 521	D-34
D-35	EXISTING LOAD	20 A	1				D-36
D-37							D-38
D-39	T-5	70 A	3				D-40
D-41							D-42

Notes:(1) NEW BREAKER.

Existing Panel: E

VOLTS: 480/277 Wye
WIRES: 4
ENCLOSURE: NEMA 1 Indoor

PHASES: 3
MAIN: 225 A
MAIN TYPE: MLO

CKT	Circuit Description	Trip	Poles	Poles	Trip	Circuit Description	CKT
E-1	EM LTG	20 A	1	1	20 A	LTG 119,126	E-2
E-3	LTG 116,123,106,109,110	20 A	1	1	20 A	LTG 119,126	E-4
E-5	LTG 119 126	20 A	1	1	20 A	LTG 119,126	E-6
E-7							E-8
E-9	DUCT HEATER 118	30 A	3	3	15 A	SPARE	E-10
E-11							E-12
E-13							E-14
E-15	HEAT PUMP 113(2)	15 A	3	3	15 A	HEAT PUMP 113	E-16
E-17							E-18
E-19							E-20
E-21	HEAT PUMP 113(2)	15 A	3	3	20 A	SEWAGE PUMPS	E-22
E-23							E-24
E-25	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	E-26
E-27	EXISTING LOAD	20 A	1	2	20 A	EXISTING LOAD	E-28
E-29	EXISTING LOAD	20 A	1				E-30
E-31	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	E-32
E-33	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	E-34
E-35	EXISTING LOAD	20 A	1	1	20 A	EXISTING LOAD	E-36
E-37				1	15 A	HEAT PUMP ELEVATOR RM (1)	E-38
E-39	T-6	70 A	3	1	15 A	HEAT PUMP 113 (1)	E-40
E-41							E-42

Notes:(1) NEW BREAKER (2) VERIFY WHICH BREAKER SERVES HP IN 113 CHANGED TO 277V & LABEL & RE-USE TO NEW HEAT PUMP LOCATED IN RM 113.

DISCONNECT SWITCH SCHEDULE

MARK	SERVES	POLES	VOLTS	DEVICE RATING	FUSING	NEMA ENCLOSURE	TYPE
SW-1	ODU-1	2	240 V	30 A	25 A	TYPE3R	FUSIBLE

MILLER ENGINEERING, INC.

WV OFFICE:
54 WEST RUN ROAD
MORGANTOWN, WV 26508
PH: (304) 291-2234

PA OFFICE:
429 LAUREL RUN ROAD
CARMICHAELS, PA 15320
PH: (724) 966-5655

CONSULTANT:
Montum Architecture, LLC
55 ER Path
Keyser, WV 26726
304-276-7151
www.montumarch.com

SEAL:

PROJECT NAME:

WV BUILDING 25 - HVAC RENOVATIONS

PROJECT OWNER:

WEST VIRGINIA GENERAL SERVICES DIVISION

PROJECT STATUS:

CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	DATE

PROJECT NUMBER: 19013
ORIGINAL PAGE SIZE: 24x36
DESIGNED BY: TWT
DRAWN BY: TWT
CHECKED BY: BCM

SHEET NAME:

ELECTRICAL SCHEDULES

E601

PROJECT MANUAL

FOR

B25 HVAC RENOVATIONS - REBID
PARKERSBURG, WV

OWNER: WV GENERAL SERVICES DIVISION
MILLER ENGINEERING, INC.
(304) 291-2234
MEI PROJECT #: 19013

09-30-2022

SECTION 00 0110

TABLE OF CONTENTS

B. 23 0519 - Meters and Gauges for HVAC Piping
C. 23 0523 - General-Duty Valves for HVAC Piping
D. 23 0529 - Hangers and Supports for HVAC Piping and Equipment
E. 23 0548 - Vibration and Seismic Controls for HVAC
F. 23 0553 - Identification for HVAC Piping and Equipment
G. 23 0593 - Testing, Adjusting, and Balancing for HVAC
H. 23 0713 - Duct Insulation
I. 23 0719 - HVAC Piping Insulation - Airex
J. 23 0913 - Instrumentation and Control Devices for HVAC
K. 23 0923 - Direct-Digital Control System for HVAC
L. 23 0993 - Sequence of Operations for HVAC Controls
M. 23 2113 - Hydronic Piping
N. 23 2114 - Hydronic Specialties
O. 23 3100 - HVAC Ducts and Casings
P. 23 3300 - Air Duct Accessories
Q. 23 3423 - HVAC Power Ventilators
R. 23 3700 - Air Outlets and Inlets
S. 23 4000 - HVAC Air Cleaning Devices
T. 23 7433 - Dedicated Outdoor Air Units
U. 23 8126.13 - Small-Capacity Split-System Air Conditioners
V. 23 8146 - Water-Source Unitary Heat Pumps

2.08 DIVISION 26 -- ELECTRICAL

A. 26 0001 - Basic Electrical Materials & Methods
B. 26 0505 - Selective Demolition for Electrical
C. 26 0519 - Low-Voltage Electrical Power Conductors and Cables
D. 26 0526 - Grounding and Bonding for Electrical Systems
E. 26 0529 - Hangers and Supports for Electrical Systems
F. 26 0533.13 - Conduit for Electrical Systems
G. 26 0533.16 - Boxes for Electrical Systems
H. 26 0553 - Identification for Electrical Systems
I. 26 0583 - Wiring Connections
J. 26 2813 - Fuses
K. 26 2816.16 - Enclosed Switches

END OF SECTION

SECTION 00 0112

LIST OF BIDDING DOCUMENTS

CENTRALIZED REQUEST FOR QUOTATIONS INCLUDING THE FOLLOWING: (INCORPORATED BY REFERENCE ONLY)

1.01 INSTRUCTIONS TO VENDORS SUBMITTING BIDS

1.02 GENERAL TERMS AND CONDITIONS

1.03 ADDITIONAL TERMS AND CONDITIONS (CONSTRUCTION CONTRACTS ONLY)

1.04 CERTIFICATION AND SIGNATURE PAGE

1.05 ADDENDUM ACKNOWLEDGEMENT FORM

1.06 GENERAL CONSTRUCTIONS SPECIFICATIONS

1.07 PRICING PAGE

1.08 PURCHASING DIVISION CONSTRUCTION BID SUBMISSION REVIEW FORM

1.09 BID BOND INSTRUCTIONS AND SAMPLE BOND FORM

1.10 DISCLOSURE OF INTERESTED PARTIES TO CONTRACTS FORM

1.11 DRUG-FREE WORKPLACE CONFORMANCE AFFIDAVIT

SECTION 00 6000

PROJECT FORMS

THE AIA FORMS FOLLOWING THIS SECTION WILL BE UTILIZED IN THE EXECUTION OF THE PROJECT

END OF SECTION

AIA® Document G701™ – 2017

Change Order

PROJECT: *(Name and address)*
WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

CONTRACT INFORMATION:
Contract For: General Construction
Date:

CHANGE ORDER INFORMATION:
Change Order Number: 001
Date:

OWNER: *(Name and address)*
West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

ARCHITECT: *(Name and address)*
Miller Engineering, Inc.
84 West Run Road
Morgantown, WV 26508

CONTRACTOR: *(Name and address)*

THE CONTRACT IS CHANGED AS FOLLOWS:
(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original Contract Sum was	$	0.00
The net change by previously authorized Change Orders	$	0.00
The Contract Sum prior to this Change Order was	$	0.00
The Contract Sum will be increased by this Change Order in the amount of	$	0.00
The new Contract Sum including this Change Order will be	$	0.00

The Contract Time will be increased by Zero (0) days.
The new date of Substantial Completion will be

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

Miller Engineering, Inc.		West Virginia General Services Division
ARCHITECT *(Firm name)*	**CONTRACTOR** *(Firm name)*	**OWNER** *(Firm name)*
SIGNATURE	**SIGNATURE**	**SIGNATURE**
Brian C. Miller, PE, President		Robert Kilpatrick
PRINTED NAME AND TITLE	**PRINTED NAME AND TITLE**	**PRINTED NAME AND TITLE**
DATE	**DATE**	**DATE**

AIA® Document G702® – 1992

Application and Certificate for Payment

TO OWNER: West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

PROJECT: WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

APPLICATION NO: 001
PERIOD TO:
CONTRACT FOR: General Construction
CONTRACT DATE:
PROJECT NOS: 19013 / / /

Distribution to:
OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER : ☐

FROM CONTRACTOR:

VIA ARCHITECT: Miller Engineering, Inc.
84 West Run Road
Morgantown, WV 26508

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703®, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM		$0.00
2. NET CHANGE BY CHANGE ORDERS		$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$0.00	
b. 0 % of Stored Material (Column F on G703)	$0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$0.00
8. CURRENT PAYMENT DUE		$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

AIA® Document G703® – 1992

Continuation Sheet

AIA Document G702®, Application and Certification for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 001
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO: 19013

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G÷C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**0.00%**	**$0.00**	**$0.00**

AIA® Document G704® – 2017

Certificate of Substantial Completion

PROJECT: *(name and address)* WV Building 25 - HVAC Renovations 5th & Avery Parkersburg, WV 26105	**CONTRACT INFORMATION:** Contract For: General Construction Date:	**CERTIFICATE INFORMATION:** Certificate Number: 001 Date:
OWNER: *(name and address)* West Virginia General Services Division 218 California Ave. Charleston, WV 25305	**ARCHITECT:** *(name and address)* Miller Engineering, Inc. 84 West Run Road Morgantown, WV 26508	**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.
(Identify the Work, or portion thereof, that is substantially complete.)

Miller Engineering, Inc.		Brian C. Miller, PE, President	
ARCHITECT *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE OF SUBSTANTIAL COMPLETION**

WARRANTIES
The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:
(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED
A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:
(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: $

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**
West Virginia General Services Division		Robert Kilpatrick	
OWNER *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**

AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)* WV Building 25 - HVAC Renovations 5th & Avery Parkersburg, WV 26105	**ARCHITECT'S PROJECT NUMBER:** 19013 **CONTRACT FOR:** General Construction **CONTRACT DATED:**	OWNER: ☐ ARCHITECT: ☐ CONTRACTOR: ☐ SURETY: ☐ OTHER: ☐
TO OWNER: *(Name and address)* West Virginia General Services Division 218 California Ave. Charleston, WV 25305		

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G706A™ – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*
WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105
TO OWNER: *(Name and address)*
West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

ARCHITECT'S PROJECT NUMBER:
19013
CONTRACT FOR: General Construction
CONTRACT DATED:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*
WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

ARCHITECT'S PROJECT NUMBER: 19013

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

TO OWNER: *(Name and address)*
West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(*Insert name and address of Surety*)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

West Virginia General Services Division
112 California Ave.
5th Floor
Charleston, WV 25305

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

AIA® Document G710™ – 2017

Architect's Supplemental Instructions

PROJECT: *(name and address)*
WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

CONTRACT INFORMATION:
Contract For: General Construction
Date:

ASI INFORMATION:
ASI Number: 001
Date:

OWNER: *(name and address)*
West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

ARCHITECT: *(name and address)*
Miller Engineering, Inc.
84 West Run Road
Morgantown, WV 26508

CONTRACTOR: *(name and address)*

The Contractor shall carry out the Work in accordance with the following supplemental instructions without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.
(Insert a detailed description of the Architect's supplemental instructions and, if applicable, attach or reference specific exhibits.)

ISSUED BY THE ARCHITECT:

Miller Engineering, Inc.
ARCHITECT *(Firm name)*

SIGNATURE

Brian C. Miller, PE, President
PRINTED NAME AND TITLE

DATE

AIA® Document G714™ – 2017

Construction Change Directive

PROJECT: *(name and address)*
WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

CONTRACT INFORMATION:
Contract For: General Construction
Date:

CCD INFORMATION:
Directive Number: 001
Date:

OWNER: *(name and address)*
West Virginia General Services Division
218 California Ave.
Charleston, WV 25305

ARCHITECT: *(name and address)*
Miller Engineering, Inc.
84 West Run Road
Morgantown, WV 26508

CONTRACTOR: *(name and address)*

The Contractor is hereby directed to make the following change(s) in this Contract:
(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits.)

PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

- ☒ Lump Sum decrease of $0.00
- ☐ Unit Price of $ per
- ☐ Cost, as defined below, plus the following fee:
  (Insert a definition of, or method for determining, cost)
- ☐ As follows:

2. The Contract Time is proposed to remain unchanged. The proposed adjustment, if any, is (0 days).

NOTE: The Owner, Architect and Contractor should execute a Change Order to supersede this Construction Change Directive to the extent they agree upon adjustments to the Contract Sum, Contract Time, or Guaranteed Maximum price for the change(s) described herein.

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

Miller Engineering, Inc.	West Virginia General Services Division	
ARCHITECT *(Firm name)*	**OWNER** *(Firm name)*	**CONTRACTOR** *(Firm name)*
SIGNATURE	**SIGNATURE**	**SIGNATURE**
Brian C. Miller, PE, President	Robert Kilpatrick	
PRINTED NAME AND TITLE	**PRINTED NAME AND TITLE**	**PRINTED NAME AND TITLE**
DATE	**DATE**	**DATE**

SECTION 00 7200

AIA GENERAL CONDITIONS (AIA A201-2017) & CONTRACT FORMS

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT ARE AIA A201-2017

1.02 A BLANK COPY OF THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

1.03 RELATED REQUIREMENTS

A. SECTION 00 7300 - SUPPLEMENTARY CONDITIONS TO AIA A201-2017: REFER TO DOCUMENT 00 7300 FOR AMENDMENTS TO THESE GENERAL CONDITIONS.

END OF SECTION

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

WV Building 25 - HVAC Renovations
5th & Avery
Parkersburg, WV 26105

THE OWNER:
(Name, legal status and address)

West Virginia General Services Division

218 California Ave.
Charleston, WV 25305

THE ARCHITECT:
(Name, legal status and address)

Miller Engineering, Inc.
84 West Run Road
Morgantown, WV 26508

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

INDEX
(Topics and numbers in bold are Section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent

consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the

Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the

Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor,

prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work,

promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will

affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and

unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance,

the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the

Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SECTION 00 7300

SUPPLEMENTARY CONDITIONS TO AIA A201-2017

PART 1 GENERAL

1.01 SUMMARY

A. The State of West Virginia Supplementary Conditions to AIA 201-2017 General Conditions of the Contract for Construction amend and supplement the General Conditions defined in Document 00 7200 - AIA General Conditions (A201-2017) & Contract Forms and other provisions of the Contract Documents as indicated below.

B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

C. A blank copy of the applicable Supplementary Conditions is attached following this page.

D. Successful Vendor will be required to sign these Supplementary Conditions with the Owner, prior to Contract award.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

State of West Virginia

Supplementary Conditions to AIA Document A201-2017
General Conditions of the Contract for Construction

The following Supplementary Conditions modify the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

Order of Precedence: The documents contained in the contract to which this document has been attached shall be interpreted in the following order of precedence:

First Priority – Documents developed by the State or agency and utilized to provide public notice of the solicitation, along with other general terms and conditions shall be first in priority.

Second Priority – This document "Supplementary Conditions to the AIA Document A201-2017 General Conditions of the Contract for Construction" shall be second in priority.

Third Priority – all other AIA documents including, but not limited to, the AIA Document A201-2017 General Conditions of the Contract for Construction and the A101-2017 Standard Form of Agreement Between Owner and Contractor (when utilized) shall be third or lower in priority.

ARTICLE 1
GENERAL PROVISIONS

Add the following Section to Article 1:

§1.05 PARTY RELATIONS

§1.05 The Owner and their consultants, the Architect and their Consultants, and the Contractor and their Subcontractors agree to proceed with the Work on the basis of mutual trust, good faith and fair dealing.

§1.1 BASIC DEFINITIONS

§1.1.1 THE CONTRACT DOCUMENTS

§1.1.1 Delete the last sentence of this Section and substitute the following:

The Contract Documents also include the Bidding Documents (Advertisement or Invitation to Bid, Request for Quotations/Bids, Instructions to Bidders, Form of Proposal, Bid Bond and Sample Forms), Performance Bond, Payment Bond, Maintenance Bond (if applicable), Certificates of Insurance, Special Provisions For Disadvantaged and Women Business Enterprise Utilization (if bound herein).

§1.1.2 THE CONTRACT

§1.1.2 Make the following changes to Section 1.1.2:

In the last sentence, insert "and the Contractor" after "The Architect" and delete "the Architect's" and insert "their respective".

§1.2 Correlation and intent of Contract Documents

§1.2.1.1 In the second sentence, remove "any law" and insert "West Virginia law or any applicable federal law". In the last sentence, remove "by law" and insert "West Virginia law or any applicable federal law".

§1.7 Digital Data Use and Transmission

§1.7 Delete the last sentence of this section in its entirety.

§1.8 Building Information Models Use and Reliance

§ 1.8 Remove this section in its entirety and replace it with the following:

"Any use of, or reliance on, all or a portion of a building information model must be approved in advance by Owner and will only be permitted if the Parties have agreed upon and executed written documents to memorialize protocols governing the use of, and reliance on, the information contained in the model."

ARTICLE 2
OWNER

§2.1 GENERAL

§ 2.1.1 Add the following after the last sentence:

Notwithstanding the foregoing, the parties understand that since Owner is a government entity, change orders will often require approval by entities in addition to owner. When owner is a state agency, those entities may include, but are not limited to, the West Virginia Attorney General's Office and the West Virginia Purchasing Division. Additionally, approval may be required by agencies providing project funding, including but not limited to, West Virginia School Building Authority and agencies of the United States federal government.

§2.1.2 Delete Section 2.1.2 in its entirety.

§2.1 Add the following Section to 2.1:

§2.1.3 The Owner and the agency funding the project reserve the right to maintain a full time or part time project representative (sometimes referred to as the "Clerk of the Works") at the project site who shall keep the Owner informed of the progress and quality of the Work and responsibilities. The Contractor shall cooperate and assist the Clerk of the Works in the performance of his/her duties. The Clerk of the Works will not interfere with or be responsible for the Contractor's supervision and direction of the Work, and the Contractor's means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work. The Clerk of the Works may facilitate communications between the Owner, Architect, and Contractor but has no authority to make decisions for the Owner, approve modifications to the Contract Documents, the Contract Time, or Contract Sum. Additionally, Contractor is not permitted to rely on or consider decisions made by the Clerk of the Works on behalf of Owner

§2.2 Evidence of the Owner's Financial Arrangements: Delete § 2.2 and all of its subsections in its entirety.

§2.3 Information and Services Required of Owner

§2.3.2 Make the following changes to Section 2.3.2:

In first sentence, delete the period and add ", when required pursuant to West Virginia Code §30-12-1 et seq." Add the following sentence at the end of Section 2.3.2: "If the Owner does not retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located, the Owner will appoint an individual to assume the role and obligations of the Architect pursuant to this Agreement."

§2.3.3 Delete this section in its entirety.

§2.3.4 Delete the last sentence of Section 2.3.4 and substitute the following:

The Contractor shall confirm the locations of each utility. If the Owner has provided geotechnical and other tests to determine subsurface conditions, the Owner will provide such documents to the Contractor; the Contractor acknowledges that it will make no claims for any subsurface or any other conditions revealed by these tests.

ARTICLE 3
CONTRACTOR

§3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§3.2.2 Add the following sentence to the end of Section 3.2.2:

Claims by Contractor resulting from its failure to familiarize itself with the site shall be deemed waived. Additionally, by submitting a bid or otherwise entering into this contract, Contractor acknowledges that it has reviewed and understands the contract documents and the work required by those documents. Any claims arising from Contractor's failure to review and understand the contract documents shall be deemed waived.

§3.2.3 Delete Section 3.2.3 in its entirety and substitute the following:

§3.2.3 The Contractor acknowledges its continuing duty to review and evaluate the Construction Documents during performance of its services and shall immediately notify the Owner and the Architect about any problems, conflicts, defects, deficiencies, inconsistencies or omissions it discovers in or between the Construction Documents; and variances it discovers between the Construction Documents and applicable laws, statutes, building codes, rules and regulations.

§ 3.2.4 Add the following clauses to Section 3.2.4:

§3.2.4.1 If the Contractor performs any Work which it knows or should have known involves a recognized problem, conflict, defect, deficiency, inconsistency or omission in the Construction Documents; or a variance between the Construction Documents and requirements of applicable laws, statutes, building codes, rules and regulations, without notifying the Owner and the Architect prior to receiving written authorization from the Architect to proceed, the Contractor shall be responsible for the consequences of such performance.

§3.2.4.2 Before ordering any materials or doing any Work, the Contractor and Subcontractors shall verify all measurements at the site and shall be responsible for the correctness of same. Discrepancies shall be reported in writing to the Architect prior to proceeding with the Work. No extra charge or compensation will be

entertained due to differences between actual measurements and dimensions indicated on the drawings, if such differences do not result in a change in the scope of Work or if the Architect failed to receive written notice before the Work was performed.

§3.4 LABOR AND MATERIALS

§3.4.1 Vendor must review and comply with the following statutory requirements affecting public construction projects, as well as any other applicable laws that are not referenced herein:

- W. Va. Code § 5-19-1 et seq., relating to domestic steel preference.
- W. Va. Code § 5A-3-56 relating to domestic steel preference, provided that the Owner is a state agency subject to Chapter 5A, Article 3 of the W. Va. Code.
- W. Va. Code § §21-1C-1 *et seq.*, relating to local hiring preference
- W. Va. Code §21-1D-1 *et seq.*, relating to drug free workplace requirements.

§3.4 Add the following Sections to 3.4:

§3.4.4 Where materials and equipment are to be provided by the Owner under the Contract Documents, the Contractor shall notify the Owner in writing as to when materials and equipment are required on the project site in sufficient time to avoid delay in the Work.

§3.4.5 The Contractor shall employ labor on the Project or in connection with the Work, capable of working harmoniously with all trade crafts and any other individuals associated with the Project. The Contractor shall also use its best efforts and implement policies and practices to minimize the likelihood of any strike, work stoppage or other labor disturbance. Except as specifically provided in this Agreement, Contractor shall not be entitled to any adjustment in the Contract sum or Contract time and shall be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes, or strikes by the work force of or provided by Contractor or its Subcontractors.

§3.5 WARRANTY

§3.5 Add the following sentence at the end of Section 3.5:

The Contractor agrees to assign to the Owner at time of Final Completion of the Work, any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such a manner so as to preserve any and all such warranties.

§3.8 ALLOWANCES

§3.8.3 Make the following change to Section 3.8.3:

§3.8.3 Delete "with reasonable promptness" and insert "in sufficient time to avoid delay in the Work."

Add the following Section to 3.8:

§3.8.4 The Contractor shall promptly submit to the Owner an itemized account of any expenditure by the Contractor of the Contract allowance in sufficient detail to allow the Owner to properly account for such expenditure.

§3.9 SUPERINTENDENT/PROJECT MANAGER

§3.9.1 Add the following sentence to the end of Section 3.9.1:

The Contractor may also employ a competent project manager.

§3.9.2 Make the following changes to Section 3.9.2:

In the first sentence, add "and project manager, if applicable" after "superintendent." In the second sentence, add "or project manager, if applicable," after "superintendent."

§3.9.3 Make the following changes to Section 3.9.3:

In the first sentence, add "or project manager, if applicable," after "superintendent." In the second sentence, add "or project manager, if applicable," after "superintendent."

§3.9 Add the following Section to 3.9:

§3.9.4 The Owner shall have the right, at any time, to direct a change in the Contractor's representatives if their performance is deemed unsatisfactory.

§3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§3.10.1 Make the following changes to Section 3.10.1:

In the first sentence, delete the word "promptly" and substitute "by the earliest reasonable date".

Add the following sentence to the end of Section 3.10.1: "The Contractor shall submit an updated construction schedule with each payment application, unless waived by the Owner."

Add the following Sections to 3.10:

§3.10.4 At any time after the first thirty (30) days of the Contract Time, if it is found that the project is two (2) weeks or more behind schedule, beyond approved time extensions, or if at any time during

the last thirty (30) days of the scheduled Contract Time the Contractor is one (1) week or more behind schedule, the Contractor shall immediately submit a plan to the Owner describing how the Work will be placed back on schedule within the remaining Contract Time.

§3.10.5 If the Owner and the Architect determine that the performance of the Work during any stage of the construction schedule last approved by the Owner has not progressed or reached the level of completion required by the Contract Documents, the Owner will have the right to order the Contractor to take corrective measures (hereinafter referred to collectively as Extraordinary Measures) necessary to expedite the progress of the Work, including, without limitation: (1) working additional shifts or overtime; (2) supplying additional manpower, equipment and facilities; and (3) other similar measures. Such Extraordinary Measures shall continue until the progress of the Work complies with the last approved construction schedule. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule after allowing for approved extensions of Contract Time as provided elsewhere in this Agreement. The Contractor is not entitled to an adjustment in the Contract Sum in connection with any Extraordinary Measures required by the Owner. The Owner may exercise its rights under this Section as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with the construction schedule.

§3.11 DOCUMENTS AND SAMPLES AT THE SITE

§3.11 Insert the following sentence at the end of Section 3.11:

The Contractor's compliance with this Section 3.11 shall be a condition precedent to any obligation of the Owner to make Final Payment pursuant to this Agreement.

§3.15 CLEANING UP

§3.15.2 Delete Section 3.15.2 in its entirety and substitute the following:

§3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and may withhold such reasonable costs as necessary for the fulfillment of the Contractor's obligation under this Section 3.15. If the reasonable costs of such cleaning exceed the Contract Sum then due the Contractor, the Contractor shall reimburse the Owner the difference within thirty (30) consecutive calendar days of the Owner's written request.

Any materials, tools, supplies, or other personal property left by the Contractor shall be deemed abandoned property and the Owner shall have no obligation to hold or store the property on behalf of Contractor and may dispose of the abandoned property as if it were property of the State of West Virginia. Provided however, that prior to treating property as abandoned and disposing of it, Owner must first provide Contractor with 10 days notice of its intent to do so. If any materials, tools, supplies or other personal property belong to a subcontractor, then Contractor is obligated to communicate this notice to its subcontractor immediately.

§3.15 Add the following Section to 3.15:

§3.15.3 In order to achieve Substantial Completion, as defined by Section 9.8, for any portion of the Work, the Contractor must have the area where the Work is located fully cleaned and all materials and/or debris removed from site. The Certificate of Substantial Completion will not be issued until the Contractor has met this obligation.

ARTICLE 4
ARCHITECT

§4.1 GENERAL

§4.2 ADMINISTRATION OF THE CONTRACT

§4.2 Make the following changes to Section 4.2:

§4.2.1 In the first sentence of Section 4.2.1 after the word Architect add ", unless otherwise indicated by the Owner,".

§4.2.2 In the first sentence of Section 4.2.2 strike the word "generally."

§4.2.3 In the first sentence of Section 4.2.3 strike the word "reasonably."

§4.2.5 Add the following sentence at the end of Section 4.2.5:

The Architect upon receipt of an Application for Payment from the Contractor shall either review and certify such amounts due for payment or return such Application for Payment to the Contractor for correction(s) within five (5) consecutive business days of receipt.

§4.2.7 Delete the first sentence of Section 4.2.7 and substitute the following:

The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples for the purpose of checking for conformance with the Contract Documents.

Modify the second to last sentence by removing it in its entirety and replacing it with the following: The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures, unless the Architect has established the required construction means, methods, techniques, sequences, or procedures, or the Contract Documents require such approval.

§4.2.8 Make the following change to Section 4.2.8:

In the first sentence, after the word Architect add ", in consultation with the Owner,".

ARTICLE 5
SUBCONTRACTORS

§5.2 Award of Subcontracts and Other Contracts for Portions of Work

§5.2.1 Add the following sentence to Section 5.2.1.

This provision in no way limits the Contractor's legal obligations to report subcontractors and labor/material suppliers under W. Va. Code § 5-22-1(f) and obtain approval under W. Va. Code § 5-22-1(g) prior to any subcontractor substitution.

§5.4 Contingent Assignment of Subcontracts: This section is removed in its entirety and replaced with the following:

§5.4 Emergency Contracts with Subcontractors:

In the event that the general contractor fails to fulfill its contractual obligations and the performance bond has failed to provide an adequate remedy, Owner has the right to execute emergency contracts with subcontractors to ensure continuation of the work, provided that doing so is in compliance with the laws, rules, and procedures governing emergency contracting authority for Owner, and the emergency contract terms comply with all other applicable laws, rules, and procedures.

ARTICLE 7
CHANGES IN THE WORK

§7.1 General

§7.1.2. In Section 7.1.2. remove the word "alone" and insert "with approval by the Owner."

§7.2 CHANGE ORDERS

§7.2 Add the following Section to 7.2:

§7.2.2 A written Change Order as defined under 7.2.1 above constitutes a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to general conditions, all direct or indirect costs associated with such change and any and all adjustment to the Contract Sum and Contract Time. The parties also understand and agree that if Owner is a state agency, change orders may require approval by entities in addition to Owner. Those entities may include, but are not limited to, the West Virginia Purchasing Division, and the West Virginia Attorney General's Office. Owner and Contractor must discuss the change order approval requirements prior to executing this agreement.

Add the following section to § 7.2

§7.2.3. Allowance for Overhead and Profit: Contractor's overhead and profit for a change order issued under this Article included in the total cost to the Owner shall not exceed based on the following schedule:

.1 For the Contractor, for any Work performed by the Contractor's own forces, fifteen percent (15%) of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractor, ten percent (10%) of the amount due the Subcontractor.

.3 For each Subcontractor or Sub-Subcontractor involved, for any Work performed by that Subcontractor's own forces, fifteen percent (15%) of the cost.

.4. For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, ten percent (10%) of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7. Estimated labor hours shall include hours only for those workmen and working foremen directly involved in performing the Change Order work. Supervision above the level of working foremen (such as general foremen, superintendent, project manager, etc.) is considered to be included in the allowance for Overhead and Profit. Hand tools are defined as equipment with a value of $1,000 or less. For Contractor owned equipment, the "bare" equipment rental rates allowed to be used for pricing Change Order proposals shall be not more than the monthly rate listed in the most current publication of The AED Green Book divided by 176 to arrive at a maximum hourly rate to be applied to the hours the equipment is used performing the Change Order work.

.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, material, equipment and Subcontractors. Details to be submitted will include detailed line item estimates showing detailed materials quantity take-offs, material prices by item and related labor hour pricing information and extensions (by line item or by drawing as applicable.) Where major cost items are Subcontracts, they shall also be itemized as prescribed above. In no case will a change involving over $10,000 be approved without such an itemization.

.7 Local Business and Occupation Taxes, if applicable, shall be calculated on the cost of the Work, overhead and profit.

.8 Overhead and profit shall not be calculated on changes in the Work involving unit prices. Unit prices are to have overhead and profit included in the price quoted.

.9 Under no circumstances is Contractor permitted to charge for the passage of time (often referred to as general conditions or winter conditions) without an identified, itemized, and concretely provable cost borne by Contractor. Contractor has a duty to mitigate costs during a delay period to the fullest extent possible and Contractor will not be paid for costs that could have been mitigated. Calculating a daily delay rate without properly identifying, itemizing, and proving actual, unmitigateable costs, is prohibited. Contractor understands and accepts that it has the responsibility to prove that costs could not be mitigated prior to submitting a request for payment.

§7.3 CONSTRUCTION CHANGE DIRECTIVES

§7.3.4 Make the following change in Section 7.3.4:

In the fourth line of the first sentence, delete the words "an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount" and substitute "an allowance for overhead and profit in accordance with clauses 7.3.11.1 through 7.3.11.9 below."

§7.3.7 Delete the word "recorded" and replace it with "processed".

§7.3.9 Delete Section 7.3.9 in its entirety and substitute the following:

§7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment provided these amounts have been added to the Contract by Change Order and a purchase order has been issued for the Change Order.

§7.3.10 Add the following sentence to the end of Section 7.3.10:

The Parties will utilize their best efforts to issue a change order within 60 days of agreement being reached, but failure to do so will not give rise to grounds for contract cancellation, penalties, or any other cause of action.

Add the following Section to 7.3:

§7.3.11 In Section 7.3.7, the allowance for overhead and profit for a change directive issued under this Article included in the total cost to the Owner shall not exceed the following schedule:

.1 For the Contractor, for any Work performed by the Contractor's own forces, fifteen percent (15%) of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractor, ten percent (10%) of the amount due the Subcontractor.

.3 For each Subcontractor or Sub-Subcontractor involved, for any Work performed by that Subcontractor's own forces, fifteen percent (15%) of the cost.

.4. For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, ten percent (10%) of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7. Estimated labor hours shall include hours only for those workmen and working foremen directly involved in performing the Change Order work. Supervision above the level of working foremen (such as general foremen, superintendent, project manager, etc.) is considered to be included in the allowance for Overhead and Profit. Hand tools are defined as equipment with a value of $1,000 or less. For Contractor owned equipment, the "bare" equipment rental rates allowed to be used for pricing Change Order proposals shall be not more than the monthly rate listed in the most current publication of The AED Green Book divided by 176 to arrive at a maximum hourly rate to be applied to the hours the equipment is used performing the Change Order work.

.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, material, equipment and Subcontractors. Details to be submitted will include detailed line item estimates showing detailed materials quantity take-offs, material prices by item and related labor hour pricing information and extensions (by line item or by drawing as applicable.) Where major cost items are Subcontracts, they shall also be itemized as prescribed above. In no case will a change involving over $10,000 be approved without such an itemization.

.7 Local Business and Occupation Taxes, if applicable, shall be calculated on the cost of the Work, overhead and profit.

.8 Overhead and profit shall not be calculated on changes in the Work involving unit prices. Unit prices are to have overhead and profit included in the price quoted.

.9 Under no circumstances is Contractor permitted to charge for the passage of time (often referred to as general conditions or winter conditions) without an identified, itemized, and concretely provable cost borne by Contractor. Contractor has a duty to mitigate costs during a delay period to the fullest extent possible and Contractor will not be paid for costs that could have been mitigated. Calculating a daily delay rate

without properly identifying, itemizing, and proving actual, unmitigateable costs, is prohibited. Contractor understands and accepts that it has the responsibility to prove that costs could not be mitigated prior to submitting a request for payment.

§7.4 Minor Changes in Work. Insert the following sentence at the end of section 7.4:

"Contractor may request that Architect provide written confirmation that Owner has agreed to the minor change, and if requested, Architect will provide it."

ARTICLE 8
TIME

§8.3 DELAYS AND EXTENSIONS OF TIME

§8.3.1 In the first sentence, delete "unusual delay in deliveries," and add "unmitigatable costs attributable to" before the words "adverse weather conditions."

ARTICLE 9
PAYMENTS AND COMPLETION

§9.1 Contract Sum

§9.1.2 Add the following sentence to the end of section 9.1.2:

"Any equitable adjustment of unit prices must be processed as a change order to the contract"

§9.2 SCHEDULE OF VALUES

§9.2 Make the following changes to Section 9.2:

In the first sentence add "and the Owner" after the first reference to the Architect. In the second sentence add "or the Owner" after Architect. Remove the last sentence in its entirety and replace it with the following:

"Any changes to the schedule of values shall be submitted to the Architect and the Owner and supported by such data to substantiate its accuracy as the Architect or owner may require. This schedule, unless objected to by the Architect or the Owner, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment."

§9.3 APPLICATIONS FOR PAYMENT

§9.3 Make the following changes to Section 9.3:

§9.3.1 In the first sentence add "and the Owner" after the first reference to the Architect and add "and other required documents" after the words "schedule of values."

§9.3.1.1 Delete clause 9.3.1.1 in its entirety and substitute the following:

§9.3.1.1 Such applications may include requests for payment on account of changes in the Work authorized by Construction Change Directives and Change Orders only after a purchase order has been issued for the Work affected.

§9.3.1 Add the following clauses to Section 9.3.1:

§9.3.1.3 Until the Work is fifty percent (50%) complete, the Owner will withhold as retainage 10% of the amount due the Contractor on account of progress payments. At the time the Work is fifty percent (50%) complete and thereafter, if the manner of completion of the Work and its progress are and remain satisfactory to the Owner and Architect, and in the absence of other good and sufficient reasons, the Architect will, on presentation by the Contractor of Consent of Surety, authorize any remaining partial payments to be paid in full.

§9.3.1.4 The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner and Architect, if the Surety withholds its consent, or for other good and sufficient reasons.

§9.4 CERTIFICATES FOR PAYMENT

§9.4.1 After the phrase "in the full amount of the Application for Payment," insert the phrase "less any retainage withheld pursuant to section 9.3.1.3,".

§9.6 PROGRESS PAYMENTS

§9.6.7 Delete Section 9.6.7 in its entirety.

§9.6.8 Delete Section 9.6.8 in its entirety.

§9.7 FAILURE OF PAYMENT

§9.7 Make the following changes in Section 9.7:

In line two, change "seven days" to "sixty days." In line four, delete "binding dispute resolution" and substitute "the West Virginia Claims Commission"

§9.8 SUBSTANTIAL COMPLETION

§9.8.3 Add the following clause to Section 9.8.3:

If Architect is required to perform more than one inspection under this subsection, Contractor shall be responsible for paying the Owner for the cost of the additional inspection, which will be paid by Owner to Architect, at the hourly rate established in the contract between Owner and Architect.

§9.8.5 Add the following clause to Section 9.8.5:

§9.8.5.1 The payment of retainage shall be sufficient to increase the total payments to ninety-five percent (95%) for the Work or designated portion thereof being accepted as Substantially Complete, less any amounts as the Architect shall determine for any Work that is not complete, not in accordance with the Contract Documents, or for unsettled claims.

§9.10 FINAL COMPLETION AND FINAL PAYMENT

§9.10.1 Add the following to the end of Section 9.10.1:

If Architect is required to perform more than one inspection under this subsection, Contractor shall be responsible for paying the Owner for the cost of the additional inspection, which will be paid by Owner to Architect, at the hourly rate established in the contract between Owner and Architect.

§9.10.2 Make the following changes in Section 9.10.2:

In the first sentence, delete "for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner)."

Add the following clause to Section 9.10.2:

§9.10.2.1 Before final payment is due the Contractor, all applicable State and local taxes must be paid. If requested by the Owner, the Contractor shall present evidence that payment or satisfaction of all such tax obligations has been made.

§9.10.3 Add the following clause to Section 9.10.3:

9.10.3.1 Unless and to the extent final completion is delayed through no fault of the Contractor as provided in Section 9.10.3, the Owner shall be under no obligation to increase payments above ninety-five percent (95%) until final completion of the Work is Certified by the Architect.

§9.10.4 Make the following changes in Section 9.10.4:

In the first sentence, delete the word "the" and replace it with "Unless and until the Contractor makes a subsequent Claim against the Owner, the".

Add the following as the last sentence. "Neither the Owner's offer of a final payment nor its acceptance by the Contractor shall legally prevent or limit the Owner's right to assert any and all counterclaims in litigation filed by the Contractor as allowed in section 15.1.8."

Add the following Sections to Article 9:

§9.11 LIQUIDATED DAMAGES

§9.11.1 The Owner will suffer financial loss if the Work is not Substantially Complete within the Contract Time as defined in Article 8, and if final completion is not achieved within the specified time frame following Substantial Completion. As liquidated damages, and not as a penalty, the Contractor and the Contractor's surety shall be liable for and shall pay the Owner the sum(s) stated in this Agreement and/or purchase order.

§9.11.2 Allowances may be made for delays due to shortages of materials and/or energy resources, subject to proof by documentation, and also for delays due to strikes or other delays beyond the control of the Contractor. All delays and any claim for extension of Contract Time must be properly documented in accordance with Section 15.1.5 by the Contractor and must be made within the time limits stated in Section 15.1.2.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

§10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

§10.2.8 Make the following changes to Section 10.2.8:

In the first sentence, delete "within a reasonable time not exceeding 21 days" and substitute "immediately".

§10.3 HAZARDOUS MATERIALS

§10.3.3 Delete Section 10.3.3 in its entirety.

ARTICLE 11
INSURANCE AND BONDS

§11.1 CONTRACTOR'S LIABILITY INSURANCE

§11.1.2 Add the following to the end of §11.1.2.

At a minimum the Contract shall provide, at the Contractor's Expense:

§11.1.2.1. a Performance Bond and a Labor and Material Payment Bond for 100% of the Contract Sum and, if applicable, a two-year roofing Maintenance Bond for the full value of the roofing system.

§11.1.2.2 An attorney-in-fact who executes the bonds on behalf of the surety shall affix thereto a certified and current copy of power of attorney.

§11.1.2.3 The bonds shall be issued on State of West Virginia forms. The Contractor shall deliver the required bonds and all other contract documents to the Owner not later than 15 days following receipt of the Owner's notice of intent to award a Contract.

§11.2 Owner's Insurance Delete section 11.2 in its entirety.

§11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

§11.4 Section 11.4 is deleted in its entirety.

§11.5.1 Make the following changes in Section 11.5.1:

In the first sentence, substitute "Contractor" for "Owner" each time the latter word appears.

§11.5.2 Delete Section 11.5.2 in its entirety and substitute the following:

§11.5.2 Prior to settlement of insured loss, the Contractor shall notify the parties of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The parties shall have 14 days from the receipt of notice to object. If no objection is made, the Contractor shall proceed as proposed and allocate the settlement accordingly. If such objection is made, the dispute shall be resolved as provided in Section 15.4. The Contractor, in that case, shall make settlement with insurers in accordance with directions of the Court. If distribution of the insurance proceeds as directed by the Court is required, the Court will direct such distribution. Any work to repair the damage will be incorporated into the contract as a change order.

ARTICLE 13
MISCELLANEOUS PROVISIONS

§13.4 TESTS AND INSPECTIONS

§13.4.1 Remove the phrase "so require" and insert in its place "prohibit delegation of the test to Contractor"

§13.6 INTEREST

§13.6 Delete Section 13.5 in its entirety and substitute the following:

Notwithstanding any other provision in the Contract Documents, West Virginia Code does not authorize the payment of interest on late payments. Accordingly, interest charges for late payment are prohibited.

Add the following Sections to Article 13:

§13.6 WORKERS COMPENSATION

The Contractor shall provide proof of compliance with West Virginia Worker's Compensation laws and regulations.

§13.7 CONTRACTOR'S LICENSE

§13.7.1 West Virginia Code §21-11-2 requires that all persons desiring to perform contractual work in West Virginia shall be duly licensed. The West Virginia Contractor's Licensing Board is empowered to issue a contractor's license.

§13.7.2 West Virginia Code §21-11-11 requires any prospective Bidder to include the Bidder's contractor's license number on its Bid. The successful Bidder will be required to furnish a copy of its contractor's license in a classification appropriate to the Work prior to issuance of a purchase order/contract.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

§14.1 TERMINATION BY THE CONTRACTOR

§14.1.1 Make the following changes in Section 14.1.1:

At the end of clause 14.1.1.3 delete "; or" and insert a period.

Delete clause 14.1.1.4 in its entirety.

§14.1.3 Delete Section 14.1.3 in its entirety and substitute the following:

§14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exist, the Contractor may, upon seven days written notice to the Owner and Architect, terminate the Contract. In such event, the Contractor shall be paid for all Work performed in accordance with the Contract Documents, for reasonable and proven termination expenses and a reasonable allowance for overhead and profit. However, such payment, exclusive of termination expenses, shall not exceed the Contract Sum as reduced by other payments made to the Contractor and further reduced by the value of Work as yet not completed. The Contractor shall be entitled to reasonable overhead, but not profit, on Work not performed.

§14.2 TERMINATION BY THE OWNER FOR CAUSE

§14.2.4 Delete Section 14.2.4 in its entirety and substitute the following:

§14.2.4 If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other

damages incurred by the Owner and not expressly waived, such excess shall not be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Owner shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§14.4.1 Delete Section 14.4.1 in its entirety and substitute the following:

§14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause upon thirty days written notice.

§14.4.3 Delete Section 14.4.3 in its entirety and substitute the following:

§14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Section 14.1.3 above.

Add the following Section to Article 14:

§14.5 FISCAL YEAR FUNDING

§14.5 Work performed under this Contract is to continue in the succeeding fiscal year contingent upon funds being appropriated by the Legislature for this Work. In the event funds are not appropriated for this Work, this Contract becomes of no effect and is null and void after June 30.

ARTICLE 15
CLAIMS AND DISPUTES

§15.1 Claims

§15.1.2 TIME LIMITS ON CLAIMS

§15.1.2 Delete Section 15.1.2 in its entirety and substitute the following:

Any applicable statute of limitations shall be in accordance with West Virginia Code.

§15.1.3 **NOTICE OF CLAIMS** Add the following to § 15.1.3:

§15.1.3.3 All claims, and notice of claims that require an increase in contract time, contract scope, or contract sum must be made in writing.

§ 15.1.8 is added to the Contract as follows:

§ 15.1.8 Counterclaims – In the event that Contractor makes a claim, Owner reserves the right to make a counterclaim and will not be barred from doing so even if final payment has been made.

§15.2 INITIAL DECISION

§15.2.1 In the third sentence of Section 15.2.1 , insert "or litigation" following the word "mediation" and remove the phrase "binding dispute resolution" and replace it with "or litigation".

§15.2.5 Delete the last sentence in Section 15.2.5 and substitute the following:

Approval or rejection of a claim by the Initial Decision Maker shall be final and binding on the parties unless it is pursued further by either party in accordance with Section 15.2.6.

§15.2.6 Make the following change to clause 15.2.6.1:

In the last sentence, delete "or pursue binding dispute resolution proceedings."

§15.2.8 Delete Section 15.2.8 in its entirety.

§15.3 MEDIATION

§15.3.1 Delete "binding dispute resolution" and substitute "litigation in a court of competent jurisdiction."

§15.3.2 Delete Section 15.3.2 in its entirety and substitute the following:

§15.3.2 The parties shall endeavor to resolve their Claims by non-binding mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement.

§ 15.3.3 Remove section 15.3.3 in its entirety

§15.4 ARBITRATION

§15.4 Delete Section 15.4 in its entirety and substitute the following:

§15.4 SETTLEMENT OF CLAIMS

§15.4.1 The Constitution of West Virginia grants the State sovereign immunity from any and all Claims against the public treasury. This immunity applies and is extended to all agencies of the State, including the Owner. It shall be in full force and effect as it relates to this Contract. The West Virginia Legislature, recognizing that certain Claims against the State may constitute a moral obligation of the State and should be heard, has established the West Virginia Claims Commission for this purpose. The Parties understand that this sovereign immunity and the Constitution of the

State of West Virginia prohibit the State and Owner, from entering into binding arbitration. Notwithstanding any provision to the contrary in the Contract Documents, all references to arbitration, regardless of whether they are included in the AIA Document A201-2017 or another related document are hereby deleted and all Claims of the Contractor for monetary relief, and only of the Contractor, arising out of or related to this Contract shall be decided by the West Virginia Claims Commission. The following Sections have been rewritten to bring them into conformance with the foregoing.

§15.4.2 Claims by the Owner may be brought against the Contractor in the Circuit Court of Kanawha County, West Virginia, or in any other court that has jurisdiction, as the Owner may elect.

§15.4.3 Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Sections 15.1.6, 9.10.4 and 9.10.5, shall, within 30 days after submission of the decision by the Initial Decision Maker, be settled for the Contractor by the West Virginia Claims Commission or, for the Owner, by the Circuit Court of Kanawha County or any other court of jurisdiction as the Owner may elect.

§15.4.4 Notice of such action shall be filed in writing with the other party to the Contract, and a copy of such notice shall be filed with the Initial Decision Maker and the Architect, if applicable.

§15.4.5 During court proceedings, the Owner and the Contractor shall comply with Section 15.1.3.

§15.4.6 Claims shall be made within the time limits specified in Section 15.2.6.1.

§15.4.7 The party filing a Claim must assert in the demand all Claims then known to that party on which action is permitted.

Add the following Article:

ARTICLE 16
EQUAL OPPORTUNITY

§16.1 COMPLIANCE WITH REGULATIONS UNDER TITLE VI OF THE FEDERAL CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 65-2 BY THE GOVERNOR OF WEST VIRGINIA DATED DECEMBER 15, 1965

§16.1.1 The Contractor agrees that it will comply with Title VI of the Federal Civil Rights Act of 1964 (P.L. 88352) and the regulations of the State of West Virginia, to the end that no person in the State, or in the United States, shall on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity for which the Contractor receives any recompense or other consideration of value, either directly or indirectly from the State; and HEREBY GIVES ASSURANCE THAT it will immediately take any measures necessary to effectuate this Agreement.

§16.1.2 If any real property or structure thereon is provided or improved, this assurance shall obligate the Contractor, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which any State payment is extended or for another purpose involving the provision of similar services or benefits. If any other goods or services are so provided, this assurance shall obligate the Contractor for the period during which it supplies such goods or services.

§16.1.3 The Contractor recognizes and agrees that such right to provide property, goods or services to the State will be extended in reliance on the representations and agreements made in assurance, and that the State shall have the right to seek judicial enforcement of this assurance. This is binding on the Contractor, its successors, transferee, and assignee, or any authorized person on behalf of the Contractor.

END OF SUPPLEMENTARY CONDITIONS TO AIA DOCUMENT A201-2017

Any provisions of the Contract Documents that conflict with these Supplementary Conditions shall be null and void unless they have been approved in writing by the applicable State purchasing officer and the Attorney General, and are clearly identified as such in the bid documents.

The Owner and Contractor hereby agree to the full performance of the covenants contained herein.

IN WITNESS WHEREOF, the Owner and Contractor have entered into this Agreement as of the effective date as stated in the A101-2017 (when utilized) or other Contract Documents.

Owner:		Contractor:	
By:	_____	By:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

This Supplementary Conditions to AIA Document A201-2017, General Conditions of the Contract for Construction, has been approved as to form on this 20th day of February, 2019, by the West Virginia Attorney General's office as indicated in the signature line below. Any modification of this document is void unless expressly approved in writing by the West Virginia Attorney General's Office.

PATRICK MORRISEY, ATTORNEY GENERAL

BY: _____

DEPUTY ATTORNEY GENERAL

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: B25 HVAC Renovations - Rebid

B. Owner's Name: WV General Services Division.

C. Architect's Name: Miller Engineering, Inc.

D. The Projects primarily consists of modifications and upgrades to the HVAC systems at WV State Building 25 in Parkersburg, WV.

1.02 CONTRACT DESCRIPTION

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 4100.

B. Scope of alterations work is indicated on drawings.

C. Plumbing: Modifications and additions to condensate piping associated with HVAC equipment.

D. HVAC: Replacement and addition of HVAC equipment. Installation of new rooftop outdoor air unit. Modifications to HVAC piping and ductwork.

E. Electrical Power and Lighting: Modifications and addition of electrical power associated with HVAC equipment.

F. General Trades: Construction of drywall chases for ductwork. Modifications to ceilings.

G. Owner will remove the following items before start of work:
   1. The owner will move office furniture and equipment as required to allow for access to perform the scope of work. The contractor will coordinate the work and schedule the relocation of office furniture and equipment with the Owner with advance notice.

1.04 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.

D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

E. Schedule the Work to accommodate Owner occupancy. The vendor will work in areas specific to equipment or systems being modified or replaced. Large areas of the building will not be handed over to permit performance of the work and there is no guarantee the work can be performed sequentially throughout a given large area.

F. The work is envisioned to be performed "top down" but that is open to discussion. Temporary provisions for ventilation air and "jumpers from new to old to maintain reasonable ventilation are part of the project requirements.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Time Restrictions:
1. Limit conduct of especially noisy exterior work to the hours of 7:00 pm to 7:00 am.

E. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 14 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

END OF SECTION

WV GSD – Building 25 HVAC Renovations
Summary/ Narrative Scope of Work
30Sep22

NOTICE:

ALL Bidders and subcontractors are encouraged to review this document prior to bidding. It does not stand alone from, but is part of, the project documents. This scope is a road map to the project work to increase the understanding of the project for bidding purposes. It is not a substitution for thorough review of all the project documents, which is required of all potential bidders prior to bidding. This written scope is part of the bidding/contract documents and contract requirements, and should be distributed to all subcontractors prior to bidding. All contractors, subcontractors, and their personnel are required to be fully and appropriately licensed for all work they perform on the project, as required by the WV State Code. Contractor is to coordinate the work of all subcontractors on this project prior to the submission of a bid.

GENERAL SUMMARY:

HVAC Renovations:
Generally, this project is to make improvements to the building related to ventilation, temperature and humidity control, and address equipment concerns. The renovations will be performed while the building remains occupied. The existing system utilizes ducted water source heat pumps (WSHPs) to condition the building spaces. WSHPs are served by a propylene glycol source loop and ducted with both supply and return duct. Three WSHPs are utilized to precondition the outside air with each serving various areas of the building. Newer boilers and a newer roof mounted fluid cooler serve the loop; all controlled by a Trane BAS system.

The project will replace the heat pump systems and, to varying degrees, revise both supply and return duct on some of the systems. A predominance of the heat pump ductwork revisions are on the return duct. In many cases, the return ducts will be revised and extended down the wall or column wrap in the space to create a low-level ducted return. The above ceiling return air filter racks at the units will be removed or sealed, and return filter grilles added in the walls and ceilings as indicated. The new return duct will be encased in a new metal stud and drywall chase running from the floor to above the ceiling.

The three outside air heat pumps and associated systems will be removed and their space in the building will be used for new outside air ductwork, service from a new, roof mounted, gas fired, DX cooling, makeup air unit; with integral energy recovery ventilator (ERV). In some locations in the building, outside air duct will be reconfigured to increase outside air flow, particularly to the first and second

floors. Exhaust ducts will be reconfigured to increase some exhaust flows and direct a majority of the exhaust air to the ERV. A small relief air duct riser will be installed to balance the pressurization between the building floors.

The BAS system will be upgraded to incorporate BACNET control of the heat pumps systems, makeup air unit, ERV, and exhaust fans, in accordance with the intent of the sequences of operation; including graphics. The BAS will also manage a relief air riser with power dampers for building and floor pressurization control.

Pre-bid/ Site Review:

A mandatory pre-bid meeting will be conducted on the day indicated in the Request for Quotations (RFQ). The pre-bid meeting will be conducted at the building and will be followed by a walk-through of the building systems, including the opportunity to look above ceilings. This will be the sole opportunity Bidders will have to be in the building. Bidders are encouraged to bring subs to the pre-bid. NO other opportunities will be available. Bidders and subs ARE NOT to attempt to access the non-public areas of the site at any other time for any purpose related to the bid, nor attempt to gain any additional information if in the facility for any other purpose.

Do not park in assigned parking for the pre-bid. Park only in public access or metered areas. No parking permits will be issued for those attending the pre-bid or walk-through.

Any COVID related restrictions in place by Executive Order will be followed during the pre-bid and walk-through.

ORDER OF WORK:

In order to expedite the acquisition of the equipment, which require what is assumed to be a long lead-time, Contractor will provide all necessary submittals for review within thirty (30) days after award of the Contract.

RELATED ITEMS:

Project Documents Note:

Where the words “all”, “typ all”, “typ” or “typical all” are used, the note shall apply to all occurrences on the project, unless otherwise specifically noted, regardless of the indications on the project drawings. Any statement which specifically points out or includes work does not exclude related work found elsewhere in the documents or requirements, it is intended to help point out items of consideration in bidding and anticipate bidder questions.

Coordination of Trades:
The responsibility for all construction coordination lies ultimately with the Vendor/ prime contractor, but also with each trade involved, as part of the bidding process. All trades involved within the project must understand their role within the project in terms of scope of work, the timing of such work, and the overall project schedule set forth in the project documents.

Owner Occupancy:
The Owner will continue to occupy the facilities during construction; though specific areas of work related to individual components will be temporary vacated to accommodate modifications. Work will be coordinated to accommodate Owner occupancy and continued operations involving staff and visitors. Work hours and outage requirements for the project will be coordinated at the kick off meeting.

Selective Demolition:
THIS PROJECT REQUIRES BOTH SCOPE AND TIMING SELECTIVE DEMOLITION. Demolition of all existing systems, equipment, and components shall be coordinated with all the other trades involved with the project.

The responsibility for all demolition coordination, scope, and timing lies ultimately with the prime contractor, but also lies with each trade involved. All systems, components, and equipment indicated by shaded areas on the project drawings will be demolished unless they are to be re-used. The timing of demolition of any systems or equipment much be in such a manner that permits continued building operations during construction. Any system or equipment demolished in a manner that disallows for continued operations during construction will be re-installed (or an Engineer-accepted temporary solution will be installed) by the contractor at no additional cost to the Owner. No system shall be taken out of service without the approval of the Owner.

Anything in any trade which is not re-used in the project must be totally removed from the facility as part of demolition, nothing will be abandoned in place unless specifically noted on the project drawings on a case by case basis. The Owner reserves the right of first refusal of removed materials and components, but otherwise all will be disposed of in accordance with best industry practices, and local, state, and federal laws.

Warranty:
The installed project shall have a one year parts and labor warranty, except the makeup air unit will have a 2 year factory parts and labor warranty, while the makeup air unit compressors will have a 5 year parts and labor warranty.

Best Industry Practices:
All work will be performed in accordance with plans and specifications and in accordance with best industry practices. The Engineer will be the sole authority

in regards to this or any project requirement and the decisions of the Engineer and Owner are final.

Location:
The general project location is WV GSD Building 25 in Parkersburg, WV.

Safety:
All work will be performed in accordance with all local, state, and federal safety regulations and with the Owner's Jobsite Safety Handbook" requirements. See Owner's Additional Requirements, Section 01 1001 of the project manual; including safety protocols such as hot work permits, etc., at all times. No fire alarm system work will be executed without prior written authorization, on a daily basis, from the Owner's Building Supervisor. The authorization must include a detailed description of the work to be performed, the potential impact on the building occupants, emergency on site call numbers for the day, and a sign off confirmation of the system's return to normal. A project fire alarm log will be kept throughout the project.

Outages:
Outages will be coordinated and scheduled with the Owner. A scheduled outage is tentative until it is confirmed in writing by the Owner and the Engineer.

Supplemental Information:
Information on the existing system with the building, including submittals, control drawings, and sequences of operation have been provided for reference and are attached to the project manual. It has been provided to document the existing conditions of the project which must be taken into account in the preparation a bid. Vendor is to highly encouraged to review this information and distribute it to subcontractors to ensure coordination during bidding. The supplemental information is part of the project documents.

TRADES INFORMATION:

Mechanical:
The removal and replacement of the heat pumps will be coordinated with the Owner for sequence of work. The general intent is to do one are of a floor area at a time but there may be instances where this is not possible.

The mechanical work includes replacement of water source heat pumps and removal of heat pump makeup air units (MAUs), both with associated ductwork and loop piping changes. A new makeup air unit will be installed on the roof and the outside air ductwork in various areas will be revised to accommodate the increased airflow, including new gas supply piping from a lower floor. The heat pump MAUs may not be removed until the new rooftop MAU is in service and the new outside air duct can supply air to the removed system ductwork. The outside air duct will be replaced in a top down manner and outside air must be

maintained through the use of temporary flex duct to make temporary connections to duct beyond the area of work. If such connections are not possible, general ventilation to areas affected by outside air duct construction will be provided using flex duct. This will be a field coordination item, reviewed by the Engineer. The requirement is not intended to be onerous, but to maintain a reasonable environment for the building occupants.

Return duct will be added to many systems to extend the existing return down the wall in the space to permit return air to come from the floor. All returns will incorporate filter grilles and the existing filter racks will be sealed during heat pump replacement. Flex connectors at all heat pumps will all be replaced or added to new ones. Exhaust duct will be reconfigured to direct most of the exhaust to the energy recovery ventilator (ERV) integral to the makeup air unit.

The existing BAS system will be replaced with a new BAS system. Fully review the HVAC sequence of operation and the original construction sequence of operation prior to bidding. Information on the existing BAS has been provided in the supplemental information attached to the project manual. The systems referenced therein which will be removed, are for reference to indicate all systems and interfaces which must be included for proper operation. The information is to help the Vendor gain a better understanding of the operation of the original system sequence and the performance requirements of the project for BAS. ALL unit controllers and building control panels will be replaced, along with all network and control wiring. The “muscle” of the BAS, valve and damper operators (excluding VAV damper controllers with integral operators) will remain if they are readily compatible with the new BAS. If this requirement presents a concern, a clarifying bid question is required, otherwise the operators will remain. The BAS will incorporate native BACNET control of the building systems as indicated in the sequence of operation. If any existing unitary equipment is Modbus or Lon, it will still be incorporated into the new BAS. In addition to the heating equipment referenced herein, building systems such as exhaust and stairwell pressurization fans and dampers will be controlled by the BAS. All existing equipment controlled or monitored by the existing BAS will be controlled and monitored by the new BAS. All controls will be in accordance with the intent of the sequences of operation; including graphics. Where the original building sequence of operation and the specified sequence conflict, the Engineer will provide guidance to resolve the conflict during submittals and construction. Final tweaks and adjustments to the BAS by the Engineer, through closeout, are a project requirement. The BAS subcontractor may remove and install ceiling tiles in the performance of the controls replacement but will be responsible for track or significant tile damage.

The following requirements must be met by the new BAS

- New controls will be tied into owners existing Trane Ensemble System for a seamless user interface. Hotlinks/targets to other applications and/or

separate web pages will be NOT accepted as a “seamless” interface to the Ensemble System.

- Provide long term data logging and archiving of data for a minimum of 3 years.
- All data, alarms, and graphics shall be available for user interface from both local workstation(s) as well as mobile devices through either a mobile browser and/or mobile app.
- BAS contractor shall provide any necessary controls hardware and/or software upgrades to the existing Ensemble System to meet the requirements of this project.
- Each BAS panel will have a dedicated UPS capable of running the panel for at least three hours. Any buss nodes or repeaters must also be covered by a UPS.
- Note that anything currently controlled by the existing BAS will be controlled by the new BAS to the requirements of the old unless specifically exempted in the new specifications. For example, the building has hot water radiant panels and cabinet unit heaters which are and will be controlled by the BAS.
- The submitted sequence of operation must be written by the controls vendor in their unique wording and may not copy or “parrot” the sequences found in the project manual.
- The BAS will incorporate an outside air makeup air unit setpoint reset as part of the sequence. The details and tweaks of the setpoint will be determined in consultation with the Engineer during startup/warranty.
- The existing control wiring may not be re-used, however control conduits may be. All wiring must be removed but unused control conduits may remain.
- All control cabinets will be replaced as the systems must operate side by side during a progressive changeover from old to new. Old cabinets will be removed and may not be used as junction boxes

Electrical:

Electrical wiring, conduits, devices, etc. will be provided as necessary to meet all electrical service requirements of the replacement project. Power to demolished equipment and any electric not reused will be demolished to source. Temporary demo will be made safe and maintained in a safe condition until the time of reconnection. All remaining and new equipment will be powered. Verify all power requirements prior to bidding. The heat pumps will be reconnected to existing power in many locations, though some require wiring and breaker changes. All wiring during construction will be “made safe” using best industry practices.

For all data locations, the RJ 45 Cat 6a jack end will be punched down in the machine rooms. The IDF end will be left with a 20 foot whip at the location in the data rooms designated by the Owner; for punch down by the Owner’s personnel.

Plumbing:
Plumbing work includes installation and reconnection of condensate drain systems for HVAC equipment as indicated in the project drawings.

Fire Alarm:
No FA modifications are anticipated in the project other than maintaining the FA system and devices as fully operational during the performance of the work, including ceiling work and maintaining the existing interfaces to the BAS system. Fire alarm work will follow the Owner's procedures for notification prior to performing work on the existing fire alarm systems. Building 25 is served by an Edwards EST system.

Fire Protection:
FP work in the base bid includes any work necessary to remove and re-install ceilings to complete the HVAC work; while maintaining full FP coverage.

Architectural/ General Trades:
The work consists of some new construction and minor demolition of existing and modifications to support the HVAC work. It includes removal and re-installation of ceiling areas required to perform the HVAC work. These areas are generally shown on the reflected ceiling plans but the specific areas will be coordinated with the other trades prior to bidding. Heat pump return ducts are to be added which extend down existing walls and will be encased in metal stud and drywall chases. The chases are small as they serve individual heat pump, not large central, systems.

Dust control measures will be in place for all work and specifically to control drywall dust. These measures may include items like area isolation, vac-sanding, or scheduled alternate works hours. Cleaning/vacuuming of affected works areas on an ongoing basis to control dust is a project requirement.

Structural Modifications:
No building structural modifications are foreseen in this project.

OTHER REQUIREMENTS:

Elevator Use:
The Vendor will be permitted to use the elevators for moving materials. The elevators will either be in the late stages of a renovation or recently completed. The bidder will use all necessary due care to protect the elevators from damage, including items such as interiors, doors, and jambs. The Bidder will document the condition of the car interior, jambs, etc. prior to the start of the HVAC work.

Roofing Integrity and Warranty:
The roofing work includes re-installation of roof curbs for makeup air systems and exhaust fans in the existing EPDM roof. The work will be performed in

accordance with the warranty manufacturer's standard details, approved by the manufacturer's inspector, and submitted prior to the start of work. The roof integrity will be maintained at all times during the project and performance of the roofing work. Temporary or night seals will be of sufficient integrity so as to prevent any damage to the building. Modifications and repairs to the EPDM roof will be made so as not to void the roof warranty. Updated warranty documentation will be provided as part of closeout documents. The roof is Firestone, installed and originally warranted in 2008 for 25 years.

Asbestos Containing Material (ACM):
There are known ACM materials in the building and are in areas which are isolated and sealed off from the rest of the building including an old boiler room which is no longer used. It is general believed that there is no known ACM in the areas to be affected by the project, but the most likely candidate would be 9 x 9 tile and mastic. If any exposed suspect material is encountered which could be damaged by the work, work will stop in the area of concern and the Owner will be notified. Removal of any discovered ACM will be by a third party under separate contract to the Owner.

Construction Implementation:
The contractor will submit a detailed project schedule prior to the start of work, for review and approval. The contractor will follow the approved project schedule and will only modify it on the written approval of the Owner and Engineer. Contractor will submit an up-to-date progress schedule, indicating progress relative to the approved schedule, every two weeks, with each pay application, or at the Owner's request. In the event the contractor falls behind schedule as indicated in the project conditions, plans for returning to the schedule will be submitted, for approval, to the Engineer.

It is generally envisioned that the HVAC work, particularly the outside, exhaust, and relief air ductwork revisions will be implemented in a top-down manner. Temporary connections will be required to continue to provide outside air from the new makeup air unit as the OA makeup heat pumps are removed. Exhaust provisions will also be made to continue to exhaust restrooms. Such connections may utilize flexible duct with the duct size and routing reviewed with the Engineer.

There is little laydown space available beyond the first floor boiler room, so provisions must be made to stage in material as needed. Up to 4 parking spaces may be available for laydown and parking, otherwise arrangements must be made for parking off site.

Site Security:
Contractor will maintain the site in a secure manner and follow the Owner's requirements for access and security for all personnel. Background checks for all personnel on site are required, and each must pass to be permitted on site.

CODES APPLICABLE To the PROJECT
Work performed on the project is to be performed under best industry practices and the following codes:

ANSI/ICC A117.1 – Accessibility Standards – Current WV Adoption
NFPA 101 - Life Safety Code - 2018
NFPA 70 - National Electric Code - 2017
NFPA 72 - Nation Fire Alarm Code - 2016
IBC - International Building Code - 2018
IMC - International Mechanical Code - 2018
IPC - International Plumbing Code - 2018
IECC – International Energy Conservation Code - 2009
IFGC - International Fuel Gas Code – 2018

End of Summary/ Narrative Scope of Work

SECTION 01 1001

OWNER'S ADDITIONAL REQUIREMENTS

PART 1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

A. Additional Project Requirements:
   1. The material attached to this section are applicable to the project in their entirety.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 OWNER REQUIREMENTS

A. Execute the project in compliance with the additonal requirements following this section.

B. Prior to beginning any work covered by the Contract, vendor shall have read, reviewed, and acknowledged in writing the attached Jobsite Safety Handbook.

END OF SECTION

Jobsite Safety Handbook

For Contractors

Department of Administration (DOA)

General Services Division (GSD)

218 California Avenue
Charleston, WV

THIS HANDBOOK IS TO BE POSTED IN A VISIBLE AREA AT ALL CONSTRUCTION PROJECTS AND/OR CONTRACTOR WORKSITES

Contractor Contact: _____ Phone #: _____

EMERGENCY CONTACTS:

Project Manager:

Name: _____ Phone #: _____

Emergency Services #: _____

GSD Safety Section:

1900 Kanawha Boulevard East, Bldg 1 Room MB12 Charleston, WV 25305

Jonathan Trout: Work# 304 352-5522 Cell# 304-205-2721

Marsha Bowling Work# 304-352-5523 Cell# 304-951-1410

Revision 4/18/22

TABLE OF CONTENTS

Jobsite Safety Handbook

JOBSITE SAFETY HANDBOOK

The following is a summary of applicable jobsite safety requirements. This handbook is intended to be used as a guide and in no way reflects all applicable safety requirements. All employees are responsible for ensuring a safe working environment. All hazards must be addressed regardless if they have been addressed in this handbook. All contractors working on GSD projects are required to follow OSHA regulations.

GSD safety and health procedures are available for review 24/7 in the Main Capitol Building basement, MB-12.

1. BUILDING ALARMS

In the event of a fire, sound the alarm and/or notify other building occupants immediately. Contractor personnel shall respond appropriately to all alarms by exiting the building immediately and remaining at least 50 feet from the building to allow for emergency response access.

2. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Workers must use personal protective equipment, such as:

- Hard hats when overhead, falling or flying hazards exist;
- Safety glasses or face shields for welding, cutting, nailing (including pneumatic), or when working with concrete and/or harmful chemicals;
- Proper shoes or boots to lessen slipping hazards and prevent toe crushing and nail punctures;
- Safety belts and/or harness systems for fall protection.

3. HOUSEKEEPING AND ACCESS AROUND SITE

- Keep all walkways and stairways clear of trash/debris and other materials such as tools and supplies to prevent tripping.
- Keep boxes, scrap lumber and other materials picked up and put in a dumpster or trash/debris area to prevent fire and tripping hazards.
- Provide enough light to allow workers to see and to prevent accidents.

4. STAIRS AND LADDERS

- All stairs are to be equipped with standard handrails.
- Keep ladders in good condition and free of defects – Do not use job made ladders.
- Inspect ladders before use for broken rungs or other defects so falls don't happen. Discard defective ladders.
- Secure ladders at the top and brace or tie off at the bottom to prevent them from slipping and causing falls.

5. SCAFFOLDS AND OTHER WORK PLATFORMS

Scaffolding is to be assembled and used according to OSHA regulations.

General scaffolding guidance:

- Provide ladders or stairs to access scaffold and work platforms safely.
- Keep scaffolds and work platforms free of debris. Keep tools and materials as neat as possible on scaffolds and platforms. This will help prevent materials from falling and workers from tripping.
- Erect scaffolds on firm and level foundations.
- Scaffold legs must be placed on firm footing and secured from movement or tipping, especially on dirt or similar surfaces (a good foundation is a must).
- Erecting and dismantling scaffolds must be under the supervision of a Competent Person.
- The competent person must inspect scaffolds before each use.
- Don't use blocks, bricks, or pieces of lumber to level or stabilize the footings. Manufactured base plates or "mud sills" made of hardwood or equivalent can be used.

Planking:

- Fully plank or use manufactured decking to provide a full work platform on scaffolds. The platform decking and/or scaffold planks must be scaffold grade and not have any visible defects.
- Extend planks or decking material at least 6' over the edge or cleat them to prevent movement. The work platform or planks must not extend more than 12" beyond the end supports to prevent tipping when stepping or working.
- Be sure that manufactured scaffolds are the proper size and that the end hooks are attached to the scaffold frame.

Guardrails:

- Guard scaffold platforms that are more than 10 feet above the ground or floor surface must have a standard guardrail. If guardrails are not practical, use other fall protection devices such as safety belts/harnesses and lanyards.
- Place the top rail approximately 42" above the work platform or planking, with a mid-rail about half that high at 21".
- Install toe boards when other workers are below the scaffold.

6. FALL PROTECTION

OSHA has specific and detailed requirements for fall protection – refer to 29 CFR 1926 Subpart M, 29 CFR 1910, 29 CFR Subpart I. A few of those requirements are listed below:

Guarding:

- Install guardrails around open floors and walls when the fall distance is 4’ or more. The top rail must withstand a 200 lb load.
- Construct guardrails with a top rail approximately 42” high with a midrail about half that high at 21”.
- Install toe boards when other workers are below the work area.
- Cover floor openings larger than 2x2 (inches) with material to safely support the working load.
- Use other fall protection systems like personal fall arrest systems (harness & lanyard), slide guards, roof anchors or alternative safe work practices when a guardrail system cannot be used. Only wear proper shoes or footwear to lessen slipping hazards.
- Train workers on safe work practices before performing work on foundation walls, roofs, trusses, or where performing exterior wall erections and floor installations.
- Flagging systems can be used, where appropriate. Flagging systems must comply with OSHA guidance.

7. EXCAVATION AND TRENCHING

Refer to OSHA regulations for excavation and trenching requirements, along with regulations for walking and working surfaces: 29 CFR 1926 Subpart P, 29 CFR 1910 Subpart D

Some of the Excavation and Trenching requirements are listed below:

- Find the location of all underground utilities by contacting West Virginia 811 before digging. Dial 811 or 800-245-4848.
- Keep workers away from digging equipment and never allow workers in an excavation when equipment is in use.
- Keep workers from getting between equipment in use and other obstacles and machinery that can cause crushing hazards.
- Keep equipment and the excavated dirt back 2 feet from the edge of the excavation.
- Have a competent person conduct daily inspections and correct any hazards before workers enter a trench or excavation.
- Provide workers a way to get into and out of a trench or excavation. Ladders and ramps can be used and must be within 25’ of the worker.
- For excavations and utility trenches over 5 feet deep, use shoring (trench boxes), benching, or slope back the sides. Unless soil analysis has been completed, the earth’s slope must be at least 1-1/2 horizontal to 1 vertical
- Keep water out of trenches with a pump or drainage system, and inspect the area for soil movement and potential cave-ins.
- Open ditches more than 24 hours or overnight must have fence protection.
- Keep drivers in the cab and workers away when dirt and other debris are being loaded into dump trucks. Workers must never be allowed under any load and must stay clear of the back of vehicles.

8. TOOLS AND EQUIPMENT

- Maintain all hand tools and equipment in safe condition and check regularly for defects. Broken or damaged tools and equipment must be removed from the jobsite.
- Use double insulated tools, or ensure the tools are grounded (check for ground plug).
- Equip all power saws (circular, skill, table, etc) with blade guards. Saws must be turned off when unattended. Unplug all power tools when not in use.
- Make sure cords are not damaged. The outer insulation must not be cut or damaged.
- Pneumatic and powder-actuated tools must only be used by trained and experienced personnel. Require proper eye protection for workers.
- Never leave cartridges for pneumatic or powder-actuated tools unattended. Keep equipment in a safe place, according to manufacturer's instructions.

9. VEHICLES AND MOBILE EQUIPMENT

- Inform workers verbally and provide training to stay clear of backing and turning vehicles and equipment with rotating cabs.
- Maintain back-up alarms for equipment with limited rear view or use someone to help guide them back.
- Verify experience or provide training to crane and heavy equipment operators.
- Maintain at least 10 foot clearance from overhead power lines when operating equipment.
- Block up the raised bed when inspecting or repairing dump trucks.
- Use a tag line to control materials moved by a crane.

10. ELECTRICAL

- Prohibit work on new and existing energized (hot) electrical circuits until all power is shut off and a positive "Lockout/Tagout System" is in place.
- Maintain all electrical tools and equipment in safe condition and check regularly for defects.
- Broken or damaged tools and equipment must be removed from the jobsite.
- Protect all temporary power (including extension cords) with Ground Fault Circuit Interrupters (GFCI's). Plug into a GFCI protected temporary power pole, a GFCI protected generator, or use a GFCI extension cord to protect against shocks.
- Locate and identify overhead electrical power lines. Make sure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.
- Exterior electrical must be approved (UL, NEMA, etc) for exterior use (no internal junction boxes).

11. FIRE PREVENTION

- Provide fire extinguishers near all welding, soldering or other ignition sources.
- Avoid spraying of paint, solvents or other types of flammable materials in rooms with poor ventilation. Build up of fumes and vapors can cause explosions or fires.
- Store gasoline and other flammable materials in a safety can outdoors or in an approved storage facility. (Metal cans with self-sealing lids).

12. CHEMICAL HAZARDS

All hazardous chemicals present in the workplace must have an up-to-date Material Safety Data Sheet (MSDS). All contractors shall maintain MSDS for chemicals used or stored at GSD facilities. All warnings and directions for use must be followed.

13. CONFINED SPACES

By definition, a **confined space**:

- Is large enough for an employee to enter fully and perform assigned work;
- Is not designed for continuous occupancy by the employee; and
- Has a limited or restricted means of entry or exit.

These spaces may include underground vaults, tanks, storage bins, pits and diked areas, vessels, silos and other similar areas.

By definition, a **permit-required confined space** has one or more of these characteristics:

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material with the potential to engulf someone who enters the space;
- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or
- Contains any other recognized serious safety or health hazards.

Entry into confined spaces without an evaluation is forbidden. Entry into permit-required confined spaces requires compliance with all OSHA requirements. Entry into non-permit spaces will require an evaluation by GSD Safety to confirm that conditions remain non-permit required.

Contractors that perform confined space entry activities are required to comply with OSHA regulations. GSD will not provide confined space rescue equipment.

14. LOCK-OUT/TAG-OUT

Before working on, repairing, adjusting or replacing equipment and machinery, all appropriate safety procedures, including lockout/tagout, must be utilized to place the machinery or equipment in a neutral or zero mechanical state.

Outside contractors are expected to have knowledge of lock-out/tag-out requirements.

Contractor Acknowledgement:

I, the undersigned, have read, reviewed and acknowledge my understanding of the General Services Division safety requirements, as set forth in this handbook. I am also aware that all applicable rules and regulations are to be followed, regardless of whether they are specifically mentioned in this handbook.

Contractor Representative (Print Name): _____

Contractor Representative Signature: _____ Date: _____

This signed acknowledgement must be signed and returned to the GSD Safety Section prior to start of project work.

1-800 428-4511

RED SHIELD WARRANTY

RED SHIELD ROOFING SYSTEM LIMITED WARRANTY

Warranty No: RO021882 **FBPCO #CC5816** **Square Footage: 19512 s.f.**
Building Owner: STATE OF WEST VIRGINIA
Building Identification: BUILDING #25
Building Address: 499 5TH STREET, PARKERSBURG, WV, 26101
Warranty Period Of: TWENTY (20) Years Beginning on: 04/15/08
Roofing Contractor: TRI STATE ROOFING & S/M (02131)

25

For the warranty period indicated above, Firestone Building Products Company, LLC ("Firestone"), an Indiana limited liability company, warrants to the Building Owner ("Owner") named above that Firestone will, subject to the Terms, Conditions and Limitations set forth below, repair any leak in the Firestone Roofing System ("System").

TERMS, CONDITIONS AND LIMITATIONS

1. **Products Covered**. The System shall mean only the Firestone brand roofing membranes, Firestone brand roofing insulations, Firestone brand roofing metal, and other Firestone brand roofing accessories when installed in accordance with Firestone technical specifications by a Firestone-licensed applicator.
2. **Notice**. In the event any leak should occur in the System, the Owner must give notice in writing or by telephone to Firestone within thirty (30) days of any occurrence of a leak. Written notice may be sent to Firestone at the street address or fax number shown on the reverse side of this Limited Warranty. Evidence of this notice shall be the receipt by Owner of a Firestone Leak Notification Acknowledgement. By so notifying Firestone, the Owner authorizes Firestone or its designee to investigate the cause of the leak.
3. **Investigation**. If upon investigation, Firestone determines that the leak is not excluded under the Terms, Conditions and Limitations set forth in this Red Shield Roofing System Limited Warranty (the "Limited Warranty"), the Owner's sole and exclusive remedy and Firestone's total liability shall be limited to the repair of the leak. Should the investigation reveal that the leak is excluded under the Terms, Conditions and Limitations, the Owner shall be responsible for payment of the investigation costs. Failure by Owner to pay for these costs shall render this Limited Warranty null and void. Firestone will advise the Owner of the type and/or extent of repairs required to be made at the Owner's expense that will permit this Limited Warranty to remain in effect for the unexpired portion of its term. Failure by the Owner to properly make these repairs in a reasonable manner using a Firestone-licensed applicator and within 60 days shall render this Limited Warranty null and void.
4. **Disputes**. Any dispute, controversy or claim between the Owner and Firestone concerning this Limited Warranty shall be settled by mediation. In the event that the Owner and Firestone do not resolve the dispute, controversy or claim in mediation, the Owner and Firestone agree that neither party will commence or prosecute any suit, proceeding, or claim other than in the courts of Hamilton County in the state of Indiana or the United States District Court, Southern District of Indiana, Indianapolis Division. Each party irrevocably consents to the jurisdiction and venue of the above-identified courts.
5. **Payment Required**. Firestone shall have no obligation under this Limited Warranty unless and until Firestone and the licensed applicator have been paid in full for all materials, supplies, services, approved written change orders, warranty costs and other costs which are included in, or incidental to, the System. In the event that repairs not covered by this Limited Warranty are necessary in the future, Firestone reserves the right to suspend this Limited Warranty until such repairs have been completed and the licensed applicator and/or Firestone has been paid in full for such repairs.
   Exclusions. Firestone shall have no obligation under this Limited Warranty, or any other liability, now or in the future if a leak or damage is caused by: (a) Natural forces, disasters, or acts of God including, but not limited to winds in excess of 55 MPH, fires, hurricanes, tornadoes, hail, wind-blown debris, lightning, earthquakes, volcanic activity, atomic radiation, insects or animals; (b) Any act(s), conduct or omission(s) by any person, or act(s) of war, terrorism or vandalism, which damage the System or which impair the System's ability to resist leaks; (c) Failure by the Owner to use reasonable care in maintaining the System, said maintenance to include, but not limited to those items listed on the reverse side of this Limited Warranty titled "Building Envelope Care and Maintenance Guide"; (d) Deterioration or failure of building components, including, but not limited to, the roof substrate, walls, mortar, HVAC units, etc.; (e) Condensation or infiltration in, through, or around the walls, copings, rooftop, hardware or equipment, building structure or underlying or surrounding materials; (f) Any acid, oil, harmful chemical, chemical or physical reaction and the like which comes in contact with the System, which damages the System, or which impairs the System's ability to resist leaks;
   (g) Alterations or repairs to the System that are not completed in accordance with our published specifications, not completed by licensed contractor, and/or where current notification procedures were not followed; (h) The architecture, engineering, construction, or design of the roof, roofing system, or building. Firestone does not undertake any analysis of the architecture or engineering required to evaluate what type of roof system is appropriate; (i) A change in building use or purpose; (j) Deterioration to metal roofing materials and accessories caused by marine salt water atmosphere or by regular spray of either salt or fresh water. or (k) Failure to give proper notice as set forth in paragraph 2(a) above.
6. **Transfer**. This Limited Warranty shall be transferable subject to Owner's payment of the current transfer fee set by Firestone.
7. **Term.** The term of this Limited Warranty shall be for the period set forth above and such term shall not be extended under any circumstances.
8. **Roof Access**. During the term of this Limited Warranty, Firestone's designated representative or employees shall have free access to the roof during regular business hours. In the event that roof access is limited due to security or other restrictions, Owner shall reimburse Firestone for all reasonable cost incurred during inspection and/or repair of the System that are due to delays associated with said restrictions. Owner shall be responsible for the damage caused by, removal and replacement of any overburdens, superstrata or overlays, either permanent or temporary, excluding accepted stone ballast or pavers, as necessary to expose the system for inspection and/or repair.
9. **Waiver**. Firestone's failure to enforce any of the terms or conditions stated herein shall not be construed as a waiver of such provision or of any other terms and conditions of this Limited Warranty.
10. **Governing Law**. This Limited Warranty shall be governed by and construed in accordance with the laws of the State of Indiana without regard to that State's rules on conflict of laws.
11. **Severability**. If any portion of this Limited Warranty is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force.

FIRESTONE DOES NOT WARRANT PRODUCTS INCORPORATED OR UTILIZED IN THIS INSTALLATION THAT WERE NOT FURNISHED BY FIRESTONE. FIRESTONE SPECIFICALLY DISCLAIMS LIABILITY UNDER ANY THEORY OF LAW ARISING OUT OF THE INSTALLATION OF, PERFORMANCE OF, OR DAMAGES SUSTAINED BY OR CAUSED BY, PRODUCTS NOT FURNISHED BY FIRESTONE.

THIS LIMITED WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND FIRESTONE HEREBY DISCLAIMS ALL SUCH WARRANTIES. THIS LIMITED WARRANTY SHALL BE THE OWNER'S SOLE AND EXCLUSIVE REMEDY AGAINST FIRESTONE, AND FIRESTONE SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGES TO THE BUILDING OR ITS CONTENTS OR THE ROOF DECK. THIS LIMITED WARRANTY CANNOT BE AMENDED, ALTERED OR MODIFIED IN ANY WAY EXCEPT IN WRITING SIGNED BY AN AUTHORIZED OFFICER OF FIRESTONE. NO OTHER PERSON HAS ANY AUTHORITY TO BIND FIRESTONE WITH ANY REPRESENTATION OR WARRANTY WHETHER ORAL OR WRITTEN.

FIRESTONE BUILDING PRODUCTS COMPANY, LLC
By: **John R. Geary**

Authorized Signature: John R. Geary
Title: **VP of Quality, Technology & Product Development**

040907

Firestone

Firestone

NOW THAT YOU HAVE A NEW FIRESTONE ROOFING SYSTEM...

Congratulations on your purchase of a Firestone Roofing System! Your new roof is a valuable asset and as such should be properly maintained. All components of the building envelope require periodic maintenance to perform as designed. "Building Envelope Care And Maintenance Guide" printed on the back of your Firestone Limited Warranty contain a number of important items to assist you in maintaining a watertight building for many years. These maintenance guidelines recommend that the building envelope be inspected at least twice yearly. Although this inspection can be performed by any qualified person selected by you, **Firestone recommends that at least one inspection every year be conducted by the Firestone Licensed Applicator who installed your roof.**

Whenever an inspection of the building is performed, Firestone recommends that the following items be included:

1 ROOF CONDITIONS REQUIRING PERIODIC INSPECTION:

Periodic inspection of the following items is very important to assure that the Firestone Roofing System not been exposed to conditions not covered by Firestone's Limited Warranty:

a. **Roof Traffic & Walkways:** The Firestone Roofing System is designed to be a waterproofing component - not a traffic bearing component of the building envelope. As stated in Firestone's System Design Instructions for all Firestone Roofing Systems, "Walkways help protect the membrane from damage due to necessary roof-top service traffic." Please note that walkways should be maintained at all roof access points, around all mechanical equipment which requires maintenance and at all areas where roof traffic more frequent than once a month is anticipated. **If, because of traffic requirements, walkways need to be installed on your roof, contact your Firestone Licensed Applicator before proceeding.**

b. **Discharges:** All components of the Firestone roof system must be protected from discharges, such as petroleum products, greases, oils and fats, acids and the like. If the building will have any such discharges, please contact Firestone for suggested methods of protection. **If, because of the presence of chemical discharges, protection measures are recommended, contact your Firestone Licensed Applicator before proceeding.**

Since 1923
TRI-STATE
ROOFING & SHEET METAL COMPANY

CONTRACTORS FOR:

ROOFING
INDUSTRIAL SHEETING
SHEET METAL FABRICATION AND ERECTION
HEATING & AIR CONDITIONING SYSTEMS
& SERVICE

P.O. BOX 188, 101 SOUTH MEADVILLE ROAD, DAVISVILLE, WEST VIRGINIA 26142 • TELEPHONE (304) 485-6593 • FAX (304) 485-2841
CONTRACTOR LICENSE #WV004542 E-Mail: parkersburg@tri-stateservice.com Website: www.tri-stateservicegroup.com

April 22, 2008

Mr. Robert P. Krause, P.E., AIA
WV General Services Division
1900 Kanawha Blvd, East
Building 1, Room MB-60
Charleston, WV 25305

Re: State Dept. Building #25 – Parkersburg, WV

Dear Mr. Krause:

We are pleased to enclose the Firestone 20 Year Limited Warranty for work performed at the State Department Building #25, Parkersburg, West Virginia.

Please acknowledge receipt of this warranty by signing below and returning one (1) copy of this letter. We have enclosed a return envelope for your convenience.

Very truly yours,

TRI-STATE ROOFING &
SHEET METAL COMPANY

Stephen R. Wallbrown

SRW/kp
Enclosures

Received By: _____

Date: April 24, 2008

warrantyltr.doc

FIRESTONE BUILDING PRODUCTS

DATE: 03/09/11

SCOTT PAULEY
STATE OF WEST VIRGINIA
2019 WASHINGTON STREET
CHARLESTON WV 25305

Via Fax: 304-558-8413

25

RE: PROJECT #: CC5816 - 01
BUILDING #25
499 5TH STREET
PARKERSBURG, WV 26101

Contractor Assigned:
Tri State Roofing & S/M
P.O. Box 188
101 South Meadville Road
Davisville, WV 261420188
304-485-6593
Fax#: 304-485-2841

Dear: SCOTT PAULEY,

On 03/09/11, Firestone received a leak notice from you. Your notice regarding the problem is considered our authorization to make repairs. We responded by directing the above referenced contractor to investigate and permanently repair the leak, if possible. If a permanent repair can not be accomplished, the contractor is to attempt to temporarily stop the inflow of water until a comprehensive investigation by Firestone personnel can be made.

Upon completion of the contractor's investigation/repair, the owner will be invoiced for any non-warranted costs. A $150 administrative fee will be added to the invoice. If you wish to avoid this fee, you must instruct the responding contractor to bill the owner directly for non-warranted costs.

We are honored to be one of few manufacturers who offer these services to our valued building owners;

* A variety of simplified methods to communicate leak activity, i.e.: warrantyservices@bfdp.com; fax: 317-575-7210; Call Center: 800-830-5612
* The ability to request service from Firestone's vast network of qualified, licensed repair contractors.
* Superior customer service from a team of trained professional and knowledgeable representatives.
* Facilitation of investigation and analysis by Firestone qualified repair contractor.
* Review and audit of contractor's response and analysis for compliance with Firestone negotiated terms.
* Additional information from our archived files available to building owner upon request (i.e. roof condition analysis, photos).

Invoices will be directed to the owner of record unless an alternate billing address is specified, in writing, to Firestone. Failure to pay an invoice will result in suspension of warranty coverage. Upon receipt of this letter, we advise you to make contact with the assigned contractor to obtain an estimated time of arrival. If you are unable to obtain this information or have additional questions, please contact Firestone Warranty Services by calling 800-428-4511. Please reference your Project number when contacting Firestone.

Sincerely,

Krista K. Pritt, Ext.54643
Warranty Services Representative

TRI-STATE ROOFING & SHEET METAL COMPANY
WORK ORDER
ROOF MAINTENANCE DIVISION

DATE: 3-10-11 JOB NO.: 90353R

BILL TO	JOB LOCATION
CUSTOMER: Firestone Payable	BLDG. NAME: DHHR Bldg #25
MANUFACTURER'S JOB #:	ADDRESS:
PO #: 144M5R-00	CITY/STATE: Parkersburg WV
ADDRESS: 250 W 96th St.	
CITY/STATE: Indianapolis IN 46260	CONTACT: Phil Brooks
PHONE: ( ) ATTN:	PHONE: ( ) 485 ~~8401~~

LEAK LOCATION: Repair roof leak Cell-541-3530

DESCRIPTION OF WORK PERFORMED: Investigated leak area. found split coming out of lap patched split & caulked it off

ITEM #	MATERIAL DESCRIPTION	QTY.	UNITS	UNIT PRICE	AMOUNT
1 ft.	9" P.S. Flashing EPDM				
½ gal	primer				
½ gal	membrane cleaner				
1 tube	lap sealant				
1	4" paint brush				
1	Rag				

SERVICE TECHNICIAN	DATE	START	FINISH	HRS.	RATE	AMOUNT
Jeromie Powell	3-14-11			1½		

- ☐ Billable T&M
- ☐ Contract
- ☐ Manufacturer's Warranty

Name of Manufacturer:

- ☐ Tri-State Warranty
- ☐ Work in Progress/More Work Needed
- ☑ Work Complete

Customer Signature: Phil Brooks

Tri-State Roofing & Sheet Metal will make repairs to localized areas that appear to be the source of leaks and will make a good faith effort to locate and try to stop leaks. Tri-State Roofing & Sheet Metal does not warrant that further leaks will not occur. Depending upon the condition, age and type of roof, future leaks may well be expected. Tri-State Roofing & Sheet Metal is not responsible for indoor air quality, interior or consequential damages, including mold, mildew, loss of use, damage to personal property, personal injury or claims from building occupants.

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 7200 - AIA General Conditions (AIA A201-2017) & Contract Forms: Additional requirements for progress payments, final payment, changes in the Work.

B. Section 00 7300 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit for Change Orders.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement (Contract).

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after Notice to Proceed.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement (Contract).

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement (Contract).

C. Forms filled out by hand will not be accepted.

D. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

E. Execute certification by signature of authorized officer.

F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
   1. Only products stored on the job site can be billed against on the application for payment.

G. Submit one electronic and three hard-copies of each Application for Payment.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor.

B. For other required changes, Engineer will issue a document requesting a change order price with appropriate backup. Answers to requests for information (RFI) do not necessarily constitute a change order request.

C. Computation of Change in Contract Amount: As specified in the Agreement (Contract) and Conditions of the Contract.

D. Substantiation of Costs: Provide full information required for evaluation, per the Contract.
   1. Provide following data:
      a. Quantities of products, labor, and equipment.
      b. Overhead and profit.
      c. Justification for any change in Contract Time.
      d. Credit for deletions from Contract, similarly documented.
   2. Support each request for additional costs with additional information, as required by the Contract, and:
      a. Provide the following data:
         1) Origin and date of claim.
         2) Dates and times work was performed, and by whom.
         3) Time records and wage rates paid.
         4) Invoices and receipts for products, equipment, and subcontracts, similarly documented.

E. Execution of Change Orders: Engineer will issue Change Orders (AIA G701) for signatures of parties as provided in the Conditions of the Contract. Agency will submit Change Order requests to the State Purchasing Division for final approval.

F. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

G. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

H. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

END OF SECTION

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions after award of the Contract.

1.02 RELATED REQUIREMENTS

A. Centralized Request For Quotation requirements for substitution requests as indicated in the General Construction specifications Item 13.

B. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.

1.03 DEFINITIONS

A. Centralized Request For Quotation requirements for substitution requests as indicated in the General Construction specifications Item 13.

B. Substitutions for Cause: Proposed requests which are for a reason demonstrated to be beyond the control of the Contractor.

C. Substitutions for Convenience of the Contractor: Proposed requests offering advantages solely to the Contractor with no significant demonstration of benefit to the Owner.

D. Substitutions for Convenience of the Owner: Proposed requests for substitution which the Contractor demonstrate that such a substitution benefits the Owner in regards to either schedule, cost, or improved function.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to any other work or trade that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.
   6. Agrees to reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

C. Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
   1. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   2. Substitution request is fully documented and properly submitted.
   3. Requested substitution will not adversely affect Contractor's construction schedule.
   4. Requested substitution has received necessary approvals of authorities having jurisdiction.
   5. Requested substitution is compatible with other portions of the Work.
   6. Requested substitution has been coordinated with other portions of the Work.
   7. Requested substitution provides specified warranty.

8. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

E. Limit each request to a single proposed substitution item. Each request to be submitted with an associated bid question for tracking purposes.
   1. Submit an electronic document, combining a contractors request form with supporting data into a single document. Confirm receipt of document with Architect/ Engineer. Architect/ Engineer may request paper submittals to complete review.
   2. Deliver physical samples, to agreed upon location, where required for material and finish review.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Centralized Request For Quotations specifies time restrictions for submitting requests for substitutions during the bidding period, and the documents required.

B. Submittal Form (before award of contract): Contractor's form as acceptable to Architect/ Engineer

C. Submit request substitution request with sufficient backup information detail to fully demonstrate compliance with all of the project requirements. Failure to submit sufficient information is sufficient reason for the request to be rejected.

D. Design Basis: Where design basis equipment is specified, any other equipment submitted is considered a substitution. The substitution request must document and demonstrate full compliance will all the requirements of the project documents and exceed the design basis equipment in the sole opinion of the Architect/ Engineer, whose decision is final.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Substitutions for Cause: Will be considered but such consideration is no guarantee of acceptance.

B. Design Basis: Where design basis equipment is specified, any other equipment submitted is considered a substitution. The substitution request must document and demonstrate full compliance will all the requirements of the project documents and exceed the design basis equipment in the sole opinion of the Architect/ Engineer, whose decision is final.

C. Substitutions for Contractor Convenience: Substitutions solely for the Convenience of the Contractor will not be accepted.

D. Substitutions for Owner Convenience: Contractor must demonstrate, and Owner must concur, that subsitution benefits the Owner in regards to either schedule, cost, and/or improved function.

E. Submittal Form (after award of contract):
   1. Utilize form indicated by Engineer.

F. Engineer will consider requests for substitutions only within 15 days after date of the Notice to Proceed.

G. All substitutions during Construction shall be submitted by a Prime/ General Contractor.

H. Substitution requests for an item are limited to 2 submissions per manufacturer.

3.04 RESOLUTION (POST AWARD)

A. Engineer may request additional information and documentation prior to rendering a decision. Contractor (Vendor) is to provide this data in an expeditious manner.

B. Architect/ Engineer will notify Contractor (Vendor) in writing of decision to accept or reject request. Judgement of the Engineer shall be final. The review of a request does not imply acceptance. A rejected submittal due to lack of information or noncompliance with contract

requirements may be resubmitted, with revisions, one time. Any resubmissions after one attempt at revision will only be made with the consent of the Owner.

3.05 ACCEPTANCE

A. Substitutions submitted by Technical Question during bidding will be accepted or rejected by the answer to the Technical Question.

B. After bidding, only by written authorization by the Architect/ Engineer.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record.

C. Substitutions accepted post-award are a contractual change to the Project. They will be documented and incorporated into the Work of the Project. Accepted substitutions which would result in a change to Contract Sum or Contract Time must be approved by Change Order.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Site mobilization meeting.

C. Progress meetings.

D. Construction progress schedule.

E. Submittals for review, information, and project closeout.

F. Number of copies of submittals.

G. Requests for Interpretation (RFI) procedures.

H. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 00 7200 - AIA General Conditions (AIA A201-2017) & Contract Forms: Dates for applications for payment

B. Section 01 6000 - Product Requirements: General product requirements.

1.03 PROJECT COORDINATOR

A. Project Coordinator: General Services Division's Owner's Representivie.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for contractor access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Engineer through the Project Coordinator:
   1. Requests for Interpretation.
   2. Shop drawings, product data, and samples.
   3. Test and inspection reports.
   4. Design data.
   5. Manufacturer's instructions and field reports.
   6. Applications for payment and change order requests.
   7. Progress schedules.
   8. Coordination drawings.
   9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Project Coordinator will coordinate and schedule a meeting after Contract Award.

B. Attendance Required:
   1. Owner.
   2. Engineer.
   3. Contractor.

C. Agenda:
   1. Submission of full list of subcontractors, list of products, schedule of values, and progress schedule.
   2. Designation of personnel representing the parties to Contract, Owner, and Engineer.
   3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   4. Scheduling.

D. Record minutes and distribute copies within two days after meeting to Engineer for review and approval. Once approved send to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. Project Coordinator will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Contractor's superintendent.
   4. Major subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Survey and building layout.
   6. Security and housekeeping procedures.
   7. Schedules.
   8. Application for payment procedures.
   9. Procedures for testing.
   10. Procedures for maintaining record documents.
   11. Requirements for start-up of equipment.
   12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and submit within two days to Architect/ Engineer for review and approval . Once approved, by Architect/ Engineer, send copies to Architect/ Engineer, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Contractor to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Engineer.
   4. Contractor's superintendent.
   5. Major subcontractors.

C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. RFIs
14. New items
15. Other business relating to work.

D. Record minutes and submit within two days to Architect/ Engineer for review and approval . Once approved, by Architect/ Engineer, send copies to Architect/ Engineer, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days of date of Notice to Proceed, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.

C. Within 10 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 5 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Owner reserves the right to require the contractor to reimburse Owner for additional charges from the Architect/Engineer for Additional Services to review the submittal more than two (2) times. Unless the proceeding results from approved change orders causing revisions to previously approved submittals.

3.05 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Prior Notification: Prio to preparing an RFI, notify Engineer by phone to discuss concern.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).

d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
   a. The Owner will make the determination of such frivolous RFIs and reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect (Engineer), and any of its consultants, due to processing of such RFIs, without appeal.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Discrete and consecutive RFI number, and descriptive subject/title.
   3. Reference to particular Contract Document(s), sheet number, spec page, ect. requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   4. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   5. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. Review Time: Engineer will respond and return RFIs to Contractor within fourteen calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.06 SUBMITTAL SCHEDULE

A. Submit to Engineer for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.

2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, role and name of subcontractor, and unique sequential submittal number..
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.07 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
    1. Product data.
    2. Shop drawings.
    3. Samples for selection.
    4. Samples for verification.

B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

E. Submittals for review may be delayed by complexity of submittal.

3.08 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
    1. Design data.
    2. Certificates.
    3. Test reports.
    4. Inspection reports.
    5. Manufacturer's instructions.
    6. Manufacturer's field reports.
    7. Other types indicated.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
    1. Project record documents.
    2. Operation and maintenance data.
    3. Warranties.
    4. Bonds.
    5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.10 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
    1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Engineer/Engineer. No drawing originally in 11 x 17 will be submitted in a size smaller than 11 x 17.

2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Engineer/Engineer.
3. Documents may be scanned and returned by the Architect (Engineer) on contractors request but the originals on file are the reference materials for the project.

B. Documents for Information: Submit two copies.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.11 SUBMITTAL PROCEDURES

A. General Requirements:
1. A List of Submittals for the project will be submitted within 10 days after Notice to Proceed.
2. Use a single transmittal for related items.
3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
4. Transmit using approved form.
   a. Use Contractor's form, subject to prior approval by Engineer.
5. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
7. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
8. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
   a. Deliver submittals to Engineer at business address.
      1) Provide 1 copy for Engineer's record plus number of copies required by the Contractor for return.
         (a) The elevator submittal requires 2 paper copies to the Engineer and 2 paper copies to the Elevator Consultant in addition to the Contractor return copies.
      2) Submit an electronic copy concurrent with delivery of paper copies.
9. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Engineer's consultants, Owner, or another affected party, allow an additional 7 days.
   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Engineer's approval, allow an additional 30 days.
   d. Some submittals may take longer to review due to their complexity, items beyond the control of the design team, or missing information/ disorganization.
10. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
11. Provide space for Contractor and Engineer review stamps.
12. When revised for resubmission, identify all changes made since previous submission.
13. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
14. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Do not reproduce Contract Documents to create shop drawings.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.12 SUBMITTAL REVIEW

A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.

C. Engineer's actions will be reflected by marking each returned submittal using actual stamp on hard copies of submittals. Electronic scan will be returned upon completion of review and Contractor's required return copies will be mailed or hand-delivered at the next progress meeting.

D. Engineer's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "No Exceptions Taken".
      b. "See Exceptions Noted".
         1) Exceptions may call for re-submission of a part of the original submittal, or for additional information, prior to release, to allow some part of the submittal to proceed to purchasing or fabricatiom, to benefit the project schedule.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Revise and Resubmit".
         1) Resubmit revised item, with review notations acknowledged and incorporated.
         2) Non-responsive resubmittals may be rejected.
         3) Resubmisstions are limited to oone attempt to re-submit. the Owner may asses additional Architectural or Enginering fees on and time and materials basis, for successive submittals, without appeal.
      b. "Not Approved".
         1) Submit item complying with requirements of Contract Documents.

E. Engineer's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

F. Owner reserves the right to require the contractor to reimburse owner for additional charges from the architect/engineer for additional services to review the submittal more than two (2) times. Unless the proceeding results from approved change orders causing revisions to previously approved submittals.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

1.02 RELATED SECTIONS

A. Section 01 1000 - Summary: Work sequence.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2015.

1.04 SUBMITTALS

A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit in PDF format.

G. Submit under transmittal letter form specified in Section 01 3000 - Administrative Requirements.

1.05 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 11 x 17 inches.

C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

E. Coordinate content with schedule of values specified in Section 01 2000 - Price and Payment Procedures.

F. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Engineer at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Control of installation.
F. Mock-ups.
G. Manufacturers' field services.
H. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.
B. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.
B. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.
    1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
    2. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.
C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:
    1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

1.06 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 MOCK-UPS

A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Engineer.

2.03 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Engineer.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.

3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
a. To provide access to Work to be tested/inspected.
b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.
4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

2.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

2.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the work, Engineer will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary sanitary facilities.

B. Temporary Controls: Barriers and enclosures.

C. Security requirements.

D. Vehicular access and parking.

E. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power and metering, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

B. Existing facilities may be used.

C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TEMPORARY SANITARY FACILITIES

A. Use of existing facilities is permitted.

B. Maintain daily in clean and sanitary condition. Failure to do so may result in requirement for job site portable toilets.

C. At end of construction, return facilities to same or better condition as originally found.

1.04 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 INTERIOR ENCLOSURES

A. Provide temporary partitions to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
   1. No attachments to existing surfaces will be allowed.

1.06 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.07 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide off-site parking for employees.

1. Parking may be available at on site but may be limited. If not available, make other provisions for parking.

D. Do not allow vehicle parking on existing pavement.

E. Coordinate delivery of materials with the Owner for access to loading docks.

1.08 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
1. Provide seeding as necessary.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 REFERENCE STANDARDS

A. NEMA MG 1 - Motors and Generators; 2014.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
   1. Any submittals that list multiple products without properly identifying the part number, model, etc. used for this specific project will be rejected.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See Section 01 1000 and construction documents for list of items required to be salvaged for reuse and relocation.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions

2. If wet-applied, have lower VOC content
    a. Have longer documented life span under normal use.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

C. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Effect on work of Owner or separate Contractor.
      f. Written permission of affected separate Contractor.
      g. Date and time work will be executed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 6 pm to 7 am.
3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached. Attachment to existing substrates is only allowed to facilitate elevator equipment. No attachments to architectural features arre allowed.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work,

assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Engineer 14 days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Engineer before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.

3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    a. Notify owner one week prior to all disruptions.
    b. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    c. All disruptions must be approved by owner.
    d. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer and Owner 14 days prior to start-up of major systems and equipment.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. Where required in specific Sections, Engineer will witness start-up of designated systems and equipment.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

H. Demonstration and instruction will be witnessed by the Engineer. Notify Engineer and Owner 14 days prior.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Engineer.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Engineer when work is considered ready for Substantial Completion.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Engineer when work is considered finally complete.

H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

I. Complete items of work determined by Engineer's final inspection.

3.14 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Incinerator Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
      c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   5. Recycled and Salvaged Materials: Include the following information for each:
      a. Identification of material, including those retrieved by installer for use on other projects.
      b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
      c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
      e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
   6. Material Reused on Project: Include the following information for each:
      a. Identification of material and how it was used in the project.
      b. Amount, in tons or cubic yards.
      c. Include weight tickets as evidence of quantity.
   7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Engineer.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Engineer with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit two copy(ies) of completed documents 15 days prior to final inspection. These copies will be reviewed and returned with comments, if necessary. Revise as required and redistribute to all parties.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 3 EXECUTION

2.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

2.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

2.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Additional Requirements: As specified in individual product specification sections.

2.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Operation and maintenance data.
      c. Field quality control data.
      d. Original warranties and bonds.

K. Provide (1) electronic copy of close-out documentation.

2.05 WARRANTIES

A. Obtain warranties, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties until time specified for submittal.

END OF SECTION

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Electrical systems and equipment.
   4. Fire Alarm Systems.
   5. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   1. Submit one copy to the Engineer, not to be returned.

B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees. Provide a detailed syllabus for each traing session for Review by the Engineer.
   1. Submit to Engineer for transmittal to Owner.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
   1. Format: DVD Disc.
   2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. All demonstration must be completed, to the satisfaction of the Engineer, prior to the scheduling of training.

B. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Training will not be conducted until the O&M manuals have been reviewed and approved. the O&M manuals will be an integral part of the training. provide a set of O&M, above the required number of closeout sets, for each two persons attending training.

B. Contractor will prepare the Training Plan based on draft plans submitted.

C. Conduct training on-site unless otherwise indicated.

D. Owner will provide classroom and seating at no cost to Contractor.

E. Provide training in minimum two hour segments.

F. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to deduct Owner travel and payroll expenses from final pay application. Contractor for personnel "show-up" time.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to deduct Owner travel and payroll expenses for personnel "show-up" time, from final pay application.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.

3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

1.02 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.01 MATERIALS

PART 3 EXECUTION

3.01 SCOPE

A. Remove portions of the building and equipment as required to accomplish the work

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Prevent movement or settlement of adjacent structures.
   2. Stop work immediately if adjacent structures appear to be in danger.

D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

3.03 EXISTING UTILITIES

A. Protect existing utilities to remain from damage.

B. Do not disrupt public utilities without permit from authority having jurisdiction.

C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without 14 prior written notification to Owner.

E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

F. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and Data): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof curbs.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. FM (AG) - FM Approval Guide; current edition.

E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
   1. Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in West Virginia.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
   3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF CURBS

A. Manufacturers:
   1. AES Industries Inc: www.aescurb.com.

B. Structural Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
   1. Roof Curb Mounting Substrate: Curb substrate consists of cast in place concrete.
   2. Sheet Metal Material:

a. Galvanized Steel: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 (230); G60 (Z180) coating designation; 14 gauge, 0.078 (minimum) thick.

3. The project consists of three (3) curbs which will be permanently connected to make one large curb assembly. the center curb (curb 1) will support a makeup air unit. Curbs 2 and 3 will provide service walkways on both side of the unit and curb and curb 2 provides duct routing path to curb 1 for connection to the unit. See drawings such as A 036, M107, and M503 for a better understanding of the curb configuration.
4. Fabricate curb bottom and mounting flanges for installation on concrete roof substrate.
5. Curbs will be totally encapsulated in EPDM. Fabricate curb to meet warranty requirements of EPDM roofing manufacturer.
6. Fabricate curb to provide secure anchorage/ blocking for all attached items such as railings, piping anchorages. Coordinate a ll locations prior to fabrication. The curb will incoporate access steps. which will be fully encapsulated in EPDM.
7. The curb details in the project documents represent the minimum acceptable design. The curb manufacturer's engineer of record will review and supplement the minimum requirements to meet the requirements of the project. Any concerns or deviations must be submitted in writing through and RFI prior to fabrication release.
8. Verify layouts and configurations indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

1.02 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).

D. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015a.

E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.

F. ITS (DIR) - Directory of Listed Products; current edition.

G. FM 4991 - Approval Standard for Firestop Contractors; 2013.

H. FM (AG) - FM Approval Guide; current edition.

I. FA (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.

J. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

K. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

L. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

M. UL (FRD) - Fire Resistance Directory; current edition.

1.03 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.04 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manufacturers:
   1. 3M Fire Protection Products: www.3m.com/firestop.
   2. Hilti, Inc: www.us.hilti.com/#sle.

B. Firestopping Materials: Any materials meeting requirements.

C. Materials: Use any material meeting requirements.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

E. Fire Ratings: Refer to drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.

B. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

C. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.03 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Engineer reserves the right to inspect all firestopping.

D. Install labeling required by code.

E. Maintain log of all fire stopping material used and locations. Submit log at close-out.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted access units.

1.02 RELATED REQUIREMENTS

A. Section 23 3300 - Air Duct Accessories: Access doors in ductwork.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Location: at mechanical, electrical, and plumbing devices located within walls that require access.
   2. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

2.02 WALL-MOUNTED UNITS

A. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Material: Steel.
   2. Door Style: Single thickness with rolled or turned in edges.
   3. Frames: 16 gage, 0.0598 inch, minimum thickness.
   4. Factory Finish: Polyester powder coat; color as selected by Architect from manufacturer's standard colors.
   5. Hardware:
      a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
      b. Latch/Lock: Screw driver slot for quarter turn cam latch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

3.03 SCHEDULE

A. Provide access hatches where required for mechanical, electrical, and plumbing device access as follows:
   1. One-handed Operation: 10”x10”
   2. Two-handed Operation: 18”x18”
   3. Head plus hands Operation: 24”x24”
   4. Body Access, inluding one location at each bathroom chase space: 36”x36”

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Gypsum wallboard.

E. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

G. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

J. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

PART 2 PRODUCTS

2.01 METAL FRAMING MATERIALS

A. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: "C" shaped with knurled or emobossed faces.
   2. Runners: U shaped, sized to match studs.

B. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

2.02 BOARD MATERIALS

A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.

2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   a. Mold resistant board is required at all locations.
3. Thickness:
   a. Vertical Surfaces: 5/8 inch.
   b. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

B. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
   1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.

2.03 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 inch.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.

D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.

B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

D. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Toilet accessories.
   3. Wall-mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.05 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.07 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2020.

E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2019.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Acoustical Panels: Gypsum, with the following characteristics:
   1. Classification: ASTM E1264 Type XX.
   2. Size: 24 by 24 inches.
   3. Thickness: 3/4 inch.
   4. Panel Edge: Square.
   5. Color: White.
   6. Suspension System: Exposed grid.

2.02 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
   1. Materials:
      a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

B. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
   1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
   2. Profile: Tee; 15/16 inch face width.
   3. Finish: Baked enamel.
   4. Color: White.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Perimeter Moldings: Same metal and finish as grid.

PART 3 EXECUTION

3.01 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

3.02 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

F. Install hold-down clips on vertical panels.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

F. SSPC-SP 1 - Solvent Cleaning; 2015.

G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
   2. MPI product number (e.g., MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Electrostatically Applied Coating: Submit manufacturer's literature including descriptive data and recommendations for mixing, application, and curing.

D. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

1.05 QUALITY ASSURANCE

A. Electrostatically Applied Coating: Provide written certification attesting that applicators have been factory trained, and that application equipment used complies with manufacturer's requirements.

1.06 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide door and frame assembly illustrating paint color, texture, and finish.

C. Locate where directed by Architect.

D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
      b. Architectural coatings VOC limits of West Virginia.

c. Meeting EPA airPLUS requirements for Low-Emissions Materials.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Engineer from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Engineer after award of contract.

2.02 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, wood, and shop primed steel.
1. Two top coats and one coat primer.
2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
3. Top Coat Sheen:
a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
b. Eggshell: MPI gloss level 3; use this sheen at all locations.
4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, and railings.
2. Two top coats and one coat primer.
3. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
4. Top Coat Sheen:
a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
5. Primer: As recommended by top coat manufacturer for specific substrate.

2.03 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been adequately prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

F. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

G. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

H. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

I. Electrostatically Applied Coating: Apply prime and finish materials in accordance with manufacturer's directions. Apply each material at not less that the manufacturer's recommended spreading rate. Use special equipment, applicators, and techniques recommended by manufacturer's as best suited for the particular applications.

J. Electrostatically Applied Coating: Apply additional coats beyond scheduled requirements when undercoating, stains or other conditions show through final paint coat until the special coating is of uniform finish, color and appearance.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 22 0001

BASIC PLUMBING MATERIALS AND METHODS

GENERAL REQUIREMENTS

1.01 CONFORM TO THE CURRENT REQUIRMENTS OF THE IMC AND IPC - 2015

1.02 PERFORM ALL WORK UNDER THIS SECTION IN ACCORDANCE WITH APPLICABLE CODES & STANDARDS AND BEST INDUSTRY AND TRADE PRACTICES.

1.03 COORDINATE ALL WITH WITH OTHER TRADES PRIOR TO BIDDING. THIS IS A RENOVATION PROJECT.

1.04 SUSPECT MATERIAL: SHOULD THE CONTRACTOR ENCOUNTER SUSPECTED ACM MATERIAL, THEY ARE TO STOP WORK IN THE AFFECTED AREA AND NOTIFY THE OWNER AND ENGINEER. THE OWNER WILL ARRANGE FOR TESTING IF THE EXISTING ACM DOCUMENTATION IS UNCLEAR. REMEDIATION OF ACM IS NOT INCLUDED IN THIS PROJECT SCOPE BY THE CONTRACTOR.

MATERIALS & METHODS

2.01 BEST INDUSTRY PRACTICES

A. Contractor will employ best industry practices and utilize the materials and methods found within the project drawings and specifications.

2.02 PIPING SPECIALTIES

A. Unions: Screwed type for pipes 2-1/2 inches (63 mm) and smaller; flanged type for pipes 3 inches (75 mm) and larger.

B. Traps: Self-scouring with no internal divisions; liquid seal of at least 2 inches (50 mm) but less than 4 inches (100 mm); brass or bronze with chrome-plating where exposed to view.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Flanges, unions, and couplings.
   3. Pipe hangers and supports.
   4. Ball valves.
   5. Butterfly valves.

1.02 REFERENCE STANDARDS

A. ASME B31.9 - Building Services Piping; 2014.

B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

D. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

E. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.

F. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.

G. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

H. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

J. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.

K. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.

L. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

M. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

N. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

O. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

P. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

Q. NSF 372 - Drinking Water System Components - Lead Content; 2011.

R. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR 26 with not less than 150 psi pressure rating.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 inch and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.04 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
   5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.

6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
   a. Bases: High-density polypropylene.
   b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
   d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
   e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
   4. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.
   5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

C. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Screw Type Anchors: Comply with ICC-ES AC193.
   2. Masonry Screw Type Anchors: Comply with ICC-ES AC106.
   3. Other Types: As required.

2.05 BALL VALVES

A. Manufacturers:
   1. Conbraco Industries, Inc: www.apollovalves.com.
   2. Nibco, Inc: www.nibco.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed.

I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

J. Provide support for utility meters in accordance with requirements of utility companies.

K. Install bell and spigot pipe with bell end upstream.

L. Install valves with stems upright or horizontal, not inverted.

M. Install water piping to ASME B31.9.

N. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

O. Sleeve pipes passing through partitions, walls, and floors.

P. Inserts:
   1. Provide inserts for placement in concrete formwork.

Q. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   8. Provide copper plated hangers and supports for copper piping.
   9. Provide hangers adjacent to motor-driven equipment with vibration isolation.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

3.06 SCHEDULES

A. Pipe Hanger Spacing:
   1. Plastic Piping:
      a. All Sizes:
         1) Maximum Hanger Spacing: 6 ft.

END OF SECTION

SECTION 23 0001

BASIC MECHANICAL MATERIALS & METHODS

GENERAL REQUIREMENTS

1.01 CONFORM TO THE CURRENT REQUIRMENTS OF THE IMC AND IPC - 2018

1.02 PERFORM ALL WORK UNDER THIS SECTION IN ACCORDANCE WITH APPLICABLE CODES & STANDARDS AND BEST INDUSTRY AND TRADE PRACTICES.

1.03 COORDINATE ALL WITH WITH OTHER TRADES PRIOR TO BIDDING. THIS IS A RENOVATION PROJECT.

1.04 ROOF PENETRATIONS: ALL ROOF PENETRATIONS WILL BE BY FACTORY APPROVED METHOD, ROUND PENETRATIONS WILL USE FACTORY ROOF BOOTS, BY SAME NAUFACTURER AS ORIGINAL ROOF. ALL PENETRATIONS MUST MEET WARRANTY REQUIREMENTS REGARDLESS OF ROOF AGE. ROOF PENETRATIONS ON ROOFS WITH AN ACTIVE WARRANTY MUST BE REVIEWED, APPROVED, AND ADDED TO THE WARRANTY WITH FULL DOCUMENTATION.

1.05 SUSPECT MATERIAL: SHOULD THE CONTRACTOR ENCOUNTER SUSPECTED ACM MATERIAL, THEY ARE TO STOP WORK IN THE AFFECTED AREA AND NOTIFY THE OWNER AND ENGINEER. THE OWNER WILL ARRANGE FOR TESTING IF THE EXISTING ACM DOCUMENTATION IS UNCLEAR. REMEDIATION OF ACM IS NOT INCLUDED IN THIS PROJECT SCOPE BY THE CONTRACTOR.

MATERIALS & METHODS

2.01 BEST INDUSTRY PRACTICES

A. Contractor will employ best industry practices and utilize the materials and methods found within the project drawings and specifications.

2.02 FIELD TESTING: VISUALLY INSPECT CONNECTIONS FOR LEAKS AT FREQUENT INTERVALS OVER ENTIRE DURATION OF TEST.

A. Domestic Water and Hydronic (Heating & Chilled Water):
   1. Hydraulic (air over water) pressure test maintained at 25 psi (172 kPa) above system operating pressure for minimum of 1 hour. Air only is not permitted.

END OF SECTION

SECTION 23 0519
METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 23 2113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Project Record Documents: Record actual locations of components and instrumentation.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Pressure Gauges: One of each type and size.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Omega Engineering, Inc: www.omega.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi and KPa.

2.02 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.

2.03 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Omega Engineering, Inc: www.omega.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Stem: 3/4 inch NPT brass.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.

C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

D. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.

E. Coil and conceal excess capillary on remote element instruments.

F. Provide instruments with scale ranges selected according to service with largest appropriate scale.

G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

I. Locate test plugs adjacent thermometers and thermometer sockets.

3.02 SCHEDULE

A. Pressure Gauge Tappings, Location:
   1. Control valves 3/4 inch & larger - inlets and outlets.
   2. Major coils - inlets and outlets.
   3. Heat exchangers - inlets and outlets.
   4. Water-source heat pumps - inlets and outlets.

B. Thermometer Sockets, Location:
   1. Control valves 1 inch & larger - inlets and outlets.
   2. Water source heat pumps - inlets and outlets.

END OF SECTION

SECTION 23 0523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Angle valves.
D. Globe valves.
E. Ball valves.
F. Butterfly valves.
G. Check valves.
H. Chainwheels.

1.02 RELATED REQUIREMENTS

A. Section 23 2113 - Hydronic Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. PTFE: Polytetrafluoroethylene.
F. RS: Rising stem.
G. SWP: Steam working pressure.
H. TFE: Tetrafluoroethylene.
I. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.
B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
C. ASME B31.9 - Building Services Piping; 2014.
D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
E. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014).
F. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2014).
G. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
H. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2015.
I. AWWA C606 - Grooved and Shouldered Joints; 2011.
J. MSS SP-67 - Butterfly Valves; 2011.
K. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.
L. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
M. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
N. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011.

O. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
   2. Protect valve parts exposed to piped medium against rust and corrosion.
   3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
   4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
   5. Secure check valves in either the closed position or open position.
   6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
      a. Provide temporary inlet and outlet caps.
      b. Maintain caps in place until installation.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors in dry environment.
      b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:
   1. Handle large valves with sling, modified to avoid damage to exposed parts.
   2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

B. Provide the following valves for the applications if not indicated on drawings:
   1. Throttling (Hydronic): Butterfly, Ball, and Globe.
   2. Isolation (Shutoff): Butterfly, Ball, and Plug.
   3. Swing Check (Pump Outlet):
      a. 2 NPS and Smaller: Bronze with bronze disc.
      b. 2-1/2 NPS and Larger: Iron with lever and weight, lever and spring, center-guided metal, or center-guided with resilient seat.

C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

D. Chilled Water Valves:
   1. 2 NPS and Smaller, Bronze Valves:
      a. Threaded ends.
      b. Angle: Bronze disc, Class 125.

c. Ball: Full port, one piece, brass trim.
d. Swing Check: Bronze disc, Class.
e. Globe: Bronze disc, Class 125.

2. 2-1/2 NPS and Larger, Iron Valves:
a. 2-1/2 NPS to 4 NPS: Flanged ends.
b. Ball: 2-1/2 NPS to 10 NPS, Class 150.
c. Grooved-End Butterfly: 2-1/2 NPS to 12 NPS, 175 CWP.
d. Swing Check: Metal seats, Class 125.
e. Grooved-End Check: 3 NPS to 12 NPS, 300 CWP.

E. Heating Hot Water Valves:
1. 2 NPS and Smaller, Bronze Valves:
a. Threaded ends.
b. Angle: Bronze disc, Class 125.
c. Ball: Full port, one piece, brass trim.
d. Swing Check: Bronze disc, Class 125.
e. Globe: Bronze disc, Class 125.

2. 2-1/2 NPS and Larger, Iron Valves:
a. 2-1/2 NPS to 4 NPS: Flanged ends.
b. Ball: 2-1/2 NPS to 10 NPS, Class 150.
c. Grooved-End Butterfly: 2-1/2 NPS to 12 NPS, 175 CWP.
d. Swing Check: 2-1/2 NPS to 12 NPS, lever and spring closure control, Class 125.
e. Grooved-End Swing Check: 3 NPS to 12 NPS, 300 CWP.
f. Globe: 2-1/2 NPS to 12 NPS, Class 125.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
2. Handwheel: Valves other than quarter-turn types.
3. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:
1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

E. Memory Stops: Fully adjustable after insulation is installed.

F. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
3. Grooved End Connections: AWWA C606.

G. General ASME Compliance:
1. Building Services Piping Valves: ASME B31.9.

H. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, ANGLE VALVES

A. Class 125: CWP Rating: 200 psig:, and Class 150: CWP Rating: 300 psig:.
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. Ends: Threaded.
   4. Stem: Bronze.
   5. Disc: Bronze, PTFE, or TFE.
   6. Packing: Asbestos free.
   7. Handwheel: Bronze or aluminum.

2.04 BRONZE, GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:.
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. Ends: Threaded or solder joint.
   4. Stem and Disc: Bronze or PTFE.
   5. Packing: Asbestos free.
      a. Handwheel: Malleable iron.

2.05 IRON, GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:, and Class 250: CWP Rating: 500 psig:.
   1. Comply with MSS SP-85, Type I.
   2. Body: Gray iron; ASTM A126, with bolted bonnet.
   3. Ends: Flanged.
   4. Trim: Bronze.
   5. Packing and Gasket: Asbestos free.
   6. Operator: Handwheel or chainwheel.

2.06 BRONZE, BALL VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.

B. One Piece, Reduced Port with Bronze Trim:
   1. Comply with MSS SP-110.
   2. CWP Rating: 400 psig.
   3. Body: Bronze.
   4. Ends: Threaded.
   5. Seats: PTFE.
   6. Stem: Bronze.
   7. Ball: Chrome plated brass.

2.07 IRON, BALL VALVES

A. Split Body, Full Port:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psig.
   3. Body: ASTM A126, gray iron.
   4. Ends: Flanged.
   5. Seats: PTFE.
   6. Stem: Stainless steel.
   7. Ball: Stainless steel.

2.08 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 300 psig (2070 kPa): 8 NPS (50 DN) or smaller and 200 psig (1389 kPa): 10 NPS (250 DN) or larger.
   1. Comply with MSS SP-67, Type I.

2. Body: Coated ductile iron.
3. Stem: Stainless steel.
4. Disc: Coated ductile iron.
5. Disc Seal: EPDM.

2.09 BRONZE, SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig (1380 kPa).
1. Comply with MSS SP-80, Type 3.
2. Body Design: Horizontal flow.
3. Body Material: Bronze, ASTM B62.
4. Ends: Threaded.
5. Disc: Bronze.

2.10 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125:
1. Comply with MSS SP-71, Type I.
2. Body Design: Clear or full waterway.
3. Body Material: ASTM A126, gray iron with bolted bonnet.
4. Ends: Flanged.
5. Trim: Bronze.
6. Gasket: Asbestos free.
7. Closer Control: Factory installed, exterior lever, and spring or weight.

2.11 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:
1. 10 NPS to 12 NPS.
2. CWP Rating: 300 psig.
3. Body Material: ASTM A536, Grade 65-45-12 ductile iron.
4. Seal: EPDM or Nitrile.
5. Disc: Ductile iron.
6. Coating: Black, non-lead paint.

2.12 IRON, CENTER-GUIDED CHECK VALVES

2.13 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to ball and butterfly valve stems.
3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
4. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Provide chainwheels on operators for valves 4 NPS and larger where located 96 NPS or more above finished floor, terminating 60 NPS above finished floor.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2014 (Reapproved 2020).

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2014).

H. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

K. MFMA-4 - Metal Framing Standards Publication; 2004.

L. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

M. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 3. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Thomas & Betts Corporation: www.tnb.com/#sle.
      c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
      d. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   3. Comply with MFMA-4.
   4. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Thermal Insulated Pipe Supports:
1. General Construction and Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
d. Insulation inserts to consist of rigid polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
c. Thickness: 60 mil.
3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

E. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Liquid Temperatures Up To 122 degrees F:
a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
b. Support From Below: MSS SP-58 Types 35 through 38.

F. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

G. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

H. Riser Clamps:
1. Provide copper plated clamps for copper tubing support.
2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
4. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with epoxy plated, plain, stainless steel, or zinc plated finish.
5. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
6. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

I. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.

J. Strut Clamps: Two-piece pipe clamp.

K. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.

L. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
   1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

M. Pipe Alignment Guides: Galvanized steel.
   1. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.

N. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

O. Pipe Shields for Insulated Piping:
   1. General Construction and Requirements:
      a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
      b. Shields Material: UV-resistant polypropylene with glass fill.
      c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
      d. Minimum Service Temperature: Minus 40 degrees F.
      e. Maximum Service Temperature: 178 degrees F.
      f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

P. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
   4. Hollow Masonry: Use toggle bolts.
   5. Hollow Stud Walls: Use toggle bolts.
   6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
   7. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
      a. Comply with MFMA-4.
      b. Channel Material: Use galvanized steel.
      c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
   8. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Engineer.

G. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

H. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

J. Secure fasteners according to manufacturer's recommended torque settings.

K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration-isolated equipment support bases.

B. Vibration isolators.

C. Vibration-isolated and/or seismically engineered roof curbs.

1.02 REFERENCE STANDARDS

A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

1.04 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Perform design and installation in accordance with applicable codes.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
   2. Steel springs to function without undue stress or overloading.
   3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
   4. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.02 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Structural Bases:
   1. Construction: Engineered, structural steel frames with welded brackets for side mounting of the isolators.
   2. Frames: Square, rectangular or T-shaped.
   3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
   4. Applications: Adjustable motor slide rails for centrifugal fans.

2.03 VIBRATION ISOLATORS

A. General Requirements:
   1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.

B. Non-Seismic Type:
   1. Elastomeric Mounts:
      a. Material: Oil, ozone, and oxidant resistant compounds.
      b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.

2. Steel Springs:
   a. Assembly: Freestanding, laterally stable without housing.
   b. Leveling Device: Rigidly connected to equipment or frame.
3. Elastomeric Hangers:
   a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
   b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
4. Spring Hanger:
   a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
   b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
5. Thrust Restraints:
   a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
   b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

2.04 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS

A. Vibration Isolation Curbs:
   1. Nonseismic Curb:
      a. Location: Between structure and rooftop equipment.
      b. Construction: Aluminum.
      c. Integral vibration isolation to comply with requirements of this section.
      d. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

3.02 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Bases:
   1. Set steel bases for one inch clearance between housekeeping pad and base.
   2. Adjust equipment level.

C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

E. Provide pairs of horizontal limit springs on fans with more than 6.0 inches WC static pressure, and on hanger supported, horizontally mounted axial fans.

F. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
   1. Up to 4 Inches Pipe Size: First three points of support.
   2. Three flexible type grooved joint couplings may be used in lieu of flexible connectors at equipment connections in applicable piping systems. The couplings shall be placed in close proximity to the vibration source.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

D. Inspect isolated equipment after installation and submit report. Include static deflections.

3.04 SCHEDULE

A. Pipe Isolation Schedule.
   1. 1 Inch Pipe Size: Isolate 120 diameters from equipment.
   2. 2 Inch Pipe Size: Isolate 90 diameters from equipment.
   3. 3 Inch Pipe Size: Isolate 80 diameters from equipment.
   4. 4 Inch Pipe Size: Isolate 75 diameters from equipment.
   5. 6 Inch Pipe Size: Isolate 60 diameters from equipment.
   6. 8 Inch Pipe Size: Isolate 60 diameters from equipment.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Automatic Controls: Tags. Key to control schematic.

C. Control Panels: Nameplates.

D. Dampers: Ceiling tacks, where located above lay-in ceiling.

E. Heat Transfer Equipment: Nameplates.

F. Instrumentation: Tags.

G. Major Control Components: Nameplates.

H. Piping: Pipe markers.

I. Relays: Tags.

J. Small-sized Equipment: Tags.

K. Thermostats: Nameplates.

L. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

A. Letter Color: White.

B. Letter Height: 1/4 inch.

C. Background Color: Black.

D. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Color: Comply with ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Color code as follows:
   1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

E. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic systems.

C. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. AABC MN-1 - AABC National Standards for Total System Balance; 2002.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   2. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Engineer and other installers to sufficiently understand the design intent for each system.
   3. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Detailed step-by-step procedures for TAB work for each system and issue, including:
         1) Terminal flow calibration (for each terminal type).
         2) Diffuser proportioning.
         3) Branch/submain proportioning.
         4) Total flow calculations.
         5) Rechecking.
         6) Diversity issues.
      f. Details of how TOTAL flow will be determined; for example:
         1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
         2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
      g. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
      h. Confirmation of understanding of the outside air ventilation criteria under all conditions.
      i. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
      j. Method of checking building static and exhaust fan and/or relief damper capacity.

k. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
l. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Revise TAB plan to reflect actual procedures and submit as part of final report.
2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
8. Include the following on the title page of each report:
a. Name of Testing, Adjusting, and Balancing Agency.
b. Address of Testing, Adjusting, and Balancing Agency.
c. Telephone number of Testing, Adjusting, and Balancing Agency.
d. Project name.
e. Project location.
f. Project Engineer.
g. Project Contractor.
h. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. AABC (NSTSB), AABC National Standards for Total System Balance.
2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:

a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

B. All TAB activities are to be scheduled with the Owner and Engineer one week prior to beginning TAB. All TAB work to be performed in the presence of Engineer. Any work without witness, will be subject to being performed again at the discretion of the Engineer, at no cost to the project.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

O. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

H. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

F. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

A. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent.
   4. Maximum Density: 8.0 lb/cu ft.

B. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

C. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.04 JACKETS

A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

B. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.

C. Aluminum Jacket: ASTM B209 (ASTM B209M).
   1. Manufacturer:
      a. Alumaguard: www.polyguardproducts.com.
   2. Thickness: 0.016 inch sheet.
   3. Finish: Smooth.
   4. Joining: Longitudinal slip joints and 2 inch laps.

5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test ductwork for design pressure prior to applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated Ducts Conveying Air Below Ambient Temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated Ducts Conveying Air Above Ambient Temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

F. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

G. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

H. Flexible Connections:
   1. Use flexible glass fiber insulation. Flexible connections are limited to 3 feet with all 90's installed hard hard duct.

3.03 SCHEDULES

A. All insulation type and thickness to be installed in compliance with IECC 2012 and ASHRAE 2010.

B. Combustion Air Duct: Rigid Glass Fiber, 1-1/2 inches thick.

C. Exhaust Ducts Within 10 ft of Exterior Openings: Rigid Glass Fiber; 1-1/2 inches thick.

D. Exhaust Ducts Exposed to Outdoor Air: Rigid Glass Fiber w/ Aluminum Jacket; 1-1/2 inches thick.

E. Outside Air Intake Ducts: Rigid Glass Fiber; 1-1/2 inches thick.

F. Supply Ducts: Rigid Glass Fiber; 1-1/2 inches thick.

G. Flexible duct take-offs to air terminals: Flexible Glass Fiber; 1-1/2 inches thick.

H. Ducts Exposed to Outdoors: Rigid Glass Fiber w/ Aluminum Jacket; 1-1/2 inches thick.

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.

B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.

C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.
   1. Compatible with insulation.

E. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.03 JACKETS

A. PVC Plastic.
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   2. Covering Adhesive Mastic: Compatible with insulation.
      a. Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 8400.

K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

A. All hydronic piping to be insulated in accordance with IECC 2012 and ASHRAE 2010.

B. Insulate hot water and hot water recirculating piping with the following type and thickness of insulaton for circulating mains and runouts:

C.	Pipe Size	100-140 (deg F)	141-200 (deg F)
D.	Up to 1-1/4"	3/4"	1"
E.	1-1/2" to 2"	1"	1-1/2"
F.	2" and up	1-1/2"	2"

G. Insulate chilled cold water piping with the following type and thickness of insulation for circulating mains and runouts:

H.	Pipe Size	Cold Water
I.	Up to 1-1/4"	3/4"
J.	1-1/2" and up	1"

END OF SECTION

SECTION 23 0913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dampers.

B. Damper Operators:
   1. Electric operators.

C. Humidistats:
   1. Room humidistats.

D. Input/Output Sensors:
   1. Temperature sensors.
   2. Humidity sensors.
   3. Static pressure (air pressure) sensors.
   4. Damper position indicators.
   5. Carbon dioxide sensors.

E. Thermostats:
   1. Electric room thermostats.
   2. Room thermostat accessories.

F. Transmitters:
   1. Building static pressure transmitters.

1.02 RELATED REQUIREMENTS

A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

C. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.

E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Thermostats and Other Exposed Sensors: One of each type.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 DAMPERS

A. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gauge, 0.1046 inch.

B. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gauge, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.

C. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.

D. Jamb Seals: Spring stainless steel.

E. Shaft Bearings: Oil impregnated sintered bronze.

F. Linkage Bearings: Oil impregnated sintered bronze.

G. Leakage: Less than one percent based on approach velocity of 2000 ft per min and 4 inches wg.

H. Maximum Pressure Differential: 6 inches wg.

I. Temperature Limits: Minus 40 to 200 degrees F.

2.03 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
   1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.

B. Electric Operators:
   1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

2.04 HUMIDISTATS

A. Room Humidistats:
   1. Wall mounted, proportioning type.
   2. Throttling Range: Adjustable 2 percent relative humidity.
   3. Operating Range: 30 to 80 percent.
   4. Maximum Temperature: 110 degrees F.
   5. Cover: Concealed setpoint.

2.05 INPUT/OUTPUT SENSORS

A. Temperature Sensors:
   1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
   2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
   3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
   4. Temperature Sensing Device: Compatible with project DDC controllers.
   5. Performance Characteristics:
      a. RTD:

1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
5) Range: Minus 40 degrees F through 220 degrees F minimum.

b. Thermistor:
1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
2) Range: Minus 25 degrees F through 122 degrees F minimum.

c. Room Sensors: Locking cover.
d. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
e. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
f. Room Security Sensors: Stainless steel cover plate with insulated back and security screws.
g. Room Temperature Sensors:
1) Construct for surface or wall box mounting.
2) Provide the following:
(a) Setpoint reset slide switch with an adjustable temperature range.
(b) Individual heating/cooling setpoint slide switches.
(c) Momentary override request push button for activation of after-hours operation.
(d) Analog thermometer.

B. Humidity Sensors:
1. Duct Mounted Sensor: Voltage type encased in a die-cast metal, weather-proof housing.
a. Input Power, Voltage Type: Class 2; 12-30 VDC/24 VAC, 15mA max.
b. Input Power, mA Type: Class 2; Loop powered 12-30 VDC only, 30 mA max.
c. Output Voltage Type: 3-wire observed polarity.
d. Output mA Type: 2-wire, not polarity sensitive (clipped and capped).

C. Static Pressure (Air Pressure) Sensors:
1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
3. Accuracy: One percent of full scale with repeatability 0.3 percent.
4. Output: 0 to 5 vdc with power at 12 to 28 vdc.

D. Damper Position Indicators: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 to 100 percent damper travel.

E. Carbon Dioxide Sensors, Wall:
1. General: Provide non-dispersive infrared (NDIR), diffusion sampling CO2 sensors with integral transducers and linear output.
2. Air Temperature: Range of 32 to 122 degrees F.
3. Relative Humidity: Range of 0 to 95 percent (non-condensing).
4. Power Input: Class 2; 12 to 30VDC or 24VAC 50/60 Hz; 100mA max.
5. Calibration Characteristics:
a. Automatically compensating algorithm for sensor drift due to sensor degradation.
b. Maximum Drift: 2 percent.
c. User calibratable with a minimum calibration interval of 5 years.
6. Construction:
a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.
b. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.
c. Housing: High impact plastic.

2.06 THERMOSTATS

A. Electric Room Thermostats:
   1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
   2. Service: Heating only.
   3. Covers: Locking with set point adjustment, with thermometer.

B. Room Thermostat Accessories:
   1. Thermostat Covers: Brushed aluminum.
   2. Insulating Bases: For thermostats located on exterior walls.
   3. Thermostat Guards: Metal mounted on separate base.
   4. Adjusting Key: As required for device.
   5. Aspirating Boxes: Where indicated for thermostats requiring flush installation.

2.07 TRANSMITTERS

A. Building Static Pressure Transmitters:
   1. One pipe, direct acting, double bell, scale range 0.01 to 6.0 inch wg positive or negative, and sensitivity of 0.0005 inch wg. Transmit electronic signal to receiver with matching scale range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches.

C. Provide thermostats in aspirating boxes in front entrances.

D. Provide guards on thermostats in entrances and public areas.

E. Provide conduit and electrical wiring in accordance with Section 26 0583. Electrical material and installation shall be in accordance with appropriate requirements of .

END OF SECTION

SECTION 23 0923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System description.

B. Operator interface.

C. Controllers.

D. Power supplies and line filtering.

E. System software.

F. Controller software.

G. HVAC control programs.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks; 2012.

B. ASHRAE Std 147 - Reducing the Release of Halogenated Refrigerants From Refrigerating and Air-Conditioning Equipment and Systems; 2013.

C. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests; Revision G, 2014.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each system component and software module.

C. Shop Drawings:
   1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
   2. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.
   3. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
   4. Indicate description and sequence of operation of operating, user, and application software.
   5. Indicate description and sequence of operation of operating, user, and application software. Submit a sequence of operations, for review and acceptance, which does not "parrot" the sequence found in the project documents and reflects the Vendors understanding of the project sequence requirements.

D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.

E. Operation and Maintenance Data:
   1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
   2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
   3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

G. Maintenance Materials:
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

PART 2 PRODUCTS

2.01 OWNER-FURNISHED PRODUCTS

A. Existing Products: Existing Trane Ensemble BAS front end system. Access will be provided to fully integarate the new systems into the front end, as part of this contract, for full BACNET operability. No black boxes or translator programs may be used to accomplish this requirement. The existing Trane system in building 25 will be totally replaced and the new system will fully integrate into the Trane Ensemble system.

2.02 MANUFACTURERS

A. Existing building automation system (BAS) is TRACER Summit by Trane. All new control panels and equipment necessary will be required to interface with existing BAS. All devices will be compatible and will interface with Trane Ensemble.

2.03 SYSTEM DESCRIPTION

A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.

B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.

C. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.

D. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units. Individual terminal unit control is specified in Section 23 0913.

E. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

F. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

G. The control system architecture may be a hybrid of wired control buss utilizing wireless sensors. Each floor of the building will have a minimum of two busses per floor, one for each half of the building with a common vertical dividing plane on all floors. The buss risers will extend back to the main BC and will not be spliced. The ground floor mechanical room and the rooftop mounted equipment will have a buss dedicated to ground floor AHU's, pumps, boilers, and the chiller.

H. The control buss wiring will be daisy chained point to point with no splices between devices. Buss wiring will extend directly up to the deck above and attach in hoop supports to the building structure. The buss must me run parallel and perpendicular to the walls. Precise record drawings of the installation will be prepared for review. Buss cabling will be foil shield plenum rated cable above ceilings and in conduit where exposed. Each individual buss run will bear a unique, readily legible, label on each end, within 6 inches of entering the device it serves. The buss wiring in the building will be a single unique color to be determined.

2.04 OPERATOR INTERFACE

A. Interface, controllers, and control backbone to communicate using BACnet protocol and addressing via a Web interface.

B. Web based via the Owner's central Ensemble server.

C. BACnet protocol to comply with ASHRAE Std 135.

2.05 CONTROLLERS

A. Building Controllers:
   1. General:
      a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
      b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
      c. Share data between networked controllers.
      d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
      e. Utilize real-time clock for scheduling.
      f. Continuously check processor status and memory circuits for abnormal operation.
      g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
      h. Communication with other network devices to be based on assigned protocol.
   2. Communication:
      a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
      b. Perform routing when connected to a network of custom application and application specific controllers.
      c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
   3. Anticipated Environmental Ambient Conditions:
      a. Outdoors and/or in Wet Ambient Conditions:
         1) Mount within waterproof enclosures.
         2) Rated for operation at 40 to 150 degrees F.
      b. Conditioned Space:
         1) Mount within dustproof enclosures.
         2) Rated for operation at 32 to 120 degrees F.
   4. Local Keypad and Display for each Controller:
      a. Use for interrogating and editing data.
      b. System security password prevents unauthorized use.
   5. Provisions for Serviceability:
      a. Diagnostic LEDs for power, communication, and processor.
      b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
   6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
   7. Power and Noise Immunity:
      a. Maintain operation at 90 to 110 percent of nominal voltage rating.

b. Perform orderly shutdown below 80 percent of nominal voltage.
c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

B. Custom Application Controller:
1. General:
a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
b. Share data between networked, microprocessor based controllers.
c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
d. Utilize real-time clock for scheduling.
e. Continuously check processor status and memory circuits for abnormal operation.
f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
g. Communication with other network devices to be based on assigned protocol.
2. Communication:
a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
a. Outdoors and/or in Wet Ambient Conditions:
1) Mount within waterproof enclosures.
2) Rated for operation at 40 to 150 degrees F.
b. Conditioned Space:
1) Mount within dustproof enclosures.
2) Rated for operation at 32 to 120 degrees F.
4. Local Keypad and Display for each Controller:
a. Use for interrogating and editing data.
b. System security password prevents unauthorized use.
5. Provisions for Serviceability:
a. Diagnostic LED's for power, communication, and processor.
b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
7. Power and Noise Immunity:
a. Maintain operation at 90 to 110 percent of nominal voltage rating.
b. Perform orderly shutdown below 80 percent of nominal voltage.
c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

C. Application Specific Controllers:
1. General:
a. Not fully user programmable, microprocessor based controllers dedicated to control specific equipment.
b. Customized for operation within the confines of equipment served.
c. Communication with other network devices to be based on assigned protocol.
2. Communication:
a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:

a. Outdoors and/or in Wet Ambient Conditions:
1) Mount within waterproof enclosures.
2) Rated for operation at 40 to 150 degrees F.
b. Conditioned Space:
1) Mount within dustproof enclosures.
2) Rated for operation at 32 to 120 degrees F.

4. Local Keypad and Display for each Controller:
a. Use for interrogating and editing data.
b. System security password prevents unauthorized use.
5. Provisions for Serviceability:
a. Diagnostic LEDs for power, communication, and processor.
b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
6. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
7. Power and Noise Immunity:
a. Maintain operation at 90 to 110 percent of nominal voltage rating.
b. Perform orderly shutdown below 80 percent of nominal voltage.
c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

D. Input/Output Interface:
1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:
a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:
a. Allow monitoring of On/Off signals from remote devices.
b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Comply with all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
b. Outputs provided with three position (On/Off/Auto) override switches.
c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
c. Drift to not exceed 0.4 percent of range per year.
8. Tri State Outputs:

a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
1) Water source heat pumps.
c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

9. System Object Capacity:
a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.06 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies:
1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
2. Limit connected loads to 80 percent of rated capacity.
3. Match DC power supply to current output and voltage requirements.
4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
7. Operational Ambient Conditions: 32 to 120 degrees F.
8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD-810 for shock and vibration.
9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:
1. Provide external or internal transient voltage and surge suppression component for all controllers.
2. Minimum surge protection attributes:
a. Dielectric strength of 1000 volts minimum.
b. Response time of 10 nanoseconds or less.
c. Transverse mode noise attenuation of 65 dB or greater.
d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.07 LOCAL AREA NETWORK (LAN)

A. Provide communication between control units over local area network (LAN).

B. LAN Capacity: Not less than 60 stations or nodes.

C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.

D. LAN Data Speed: Minimum 19.2 Kb.

E. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.

F. Transmission Median: Fiber optic or single pair of solid 24 gauge twisted, shielded copper cable.

G. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.08 WIRELESS CONTROL NETWORK (WCN)

A. Provide a wireless ("wifi") control network (WCN) meeting the requirements found herein.

B. The WCN portion of the BAS system will be used for sensing building parameters such as: temperature, humidity, CO2, pressure etc., as are available from the manufacturer's published catalog.

C. The WCN will incoporate the following:
   1. A mesh topology consisting of
      a. At least two Personal Area Network (PAN) Devices per floor.
      b. Sufficient density to ensure system reliability, as determined by the Engineer during the project and warranty period.
      c. Provide a fully planned and verified mesh layout.
      d. Dynamic re-routing or self-healing in the event of device failure/orphanage.
      e. At least two neighboring nodes or Full-Function Devices (FFDs) to ensure 2 alternate pathways for all end devices or Reduced-Function Devices (RFDs).
   2. Data security ensured by AES-128 encryption or other industry standard encryption meeting the requirements of IEEE 802.15.4.
   3. A submitted simulation of building layout with all devices prior to installation.
   4. A submitted verification of wireless pathways, density, and self-healing post installation.
   5. Device lifespan of 2 years at minimum with AA batteries.
   6. No interference with the existing WIFI or cell services throughout the building.
   7. Design basis is to be the Zigbee specification of IEEE 802.15.4.

2.09 SYSTEM SOFTWARE

A. Operating System:
   1. Concurrent, multi-tasking capability.
      a. Common Software Applications Supported: Microsoft Excel.
      b. Acceptable Operating Systems: Windows 11.
   2. System Graphics:
      a. Allow up to 20 graphic screens, simultaneously displayed for comparison and monitoring of system status.
      b. Animation displayed by shifting image files based on object status.
      c. Provide method for operator with password to perform the following:
         1) Move between, change size, and change location of graphic displays.
         2) Modify on-line.
         3) Add, delete, or change dynamic objects consisting of:
            (a) Analog and binary values.
            (b) Dynamic text.
            (c) Static text.
            (d) Animation files.
   3. Custom Graphics Generation Package:
      a. Create, modify, and save graphic files and visio format graphics in PCX formats.
      b. HTML graphics to support web browser compatible formats.
      c. Capture or convert graphics from AutoCAD.
   4. Standard HVAC Graphics Library:
      a. HVAC Equipment:
         1) Chillers.
         2) Boilers.
         3) Air Handlers.
         4) Terminal HVAC Units.
         5) Fan Coil Units.
      b. Ancillary Equipment:
         1) Fans.
         2) Pumps.
         3) Coils.
         4) Valves.
         5) Dampers.

B. Interface System Applications:
   1. Automatic System Database Save and Restore Functions:
      a. Current database copy of each Building Controller is automatically stored on hard disk.
      b. Automatic update occurs upon change in any system panel.
      c. In the event of database loss in any system panel, the first device to detect the loss automatically restores the database for that panel unless disabled by the operator.
   2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
      a. Save database from any system panel.
      b. Clear a panel database.
      c. Initiate a download of a specified database to any system panel.
   3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
   4. On-line Help:
      a. Context-sensitive system assists operator in operation and editing.
      b. Available for all applications.
      c. Relevant screen data provided for particular screen display.
      d. Additional help available via hypertext.
   5. Security:
      a. Operator log-on requires user name and password to view, edit, add, or delete data.
      b. System security selectable for each operator.
      c. System supervisor sets passwords and security levels for all other operators.
      d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.
      e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
      f. All system security data stored in encrypted format.
   6. System Diagnostics:
      a. Operations Automatically Monitored:
         1) Modems.
         2) Network connections.
         3) Building management panels.
         4) Controllers.
      b. Device failure is annunciated to the operator.
   7. Alarm Processing:
      a. All system objects are configurable to "alarm in" and "alarm out" of normal state.
      b. Configurable Objects:
         1) Alarm limits.
         2) Alarm limit differentials.
         3) States.
         4) Reactions for each object.
   8. Alarm Messages:
      a. Descriptor: English language.
      b. Recognizable Features:
         1) Source.
         2) Location.
         3) Nature.
   9. Configurable Alarm Reactions by Interface and Time of Day:
      a. Logging.
      b. Printing.
      c. Starting programs.
      d. Displaying messages.
      e. Dialing out to remote locations.

f. Paging.
g. Providing audible annunciation.
h. Displaying specific system graphics.

10. Custom Trend Logs:
    a. Definable for any data object in the system including interval, start time, and stop time.
    b. Trend Data:
        1) Sampled and stored on the building controller panel.
        2) Archivable on hard disk.
        3) Retrievable for use in reports, spreadsheets and standard database programs.
        4) Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.
        5) Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.
11. Alarm and Event Log:
    a. View all system alarms and change of states from any system location.
    b. Events listed chronologically.
    c. Operator with proper security acknowledges and clears alarms.
    d. Alarms not cleared by operator are archived to the Ensemble system.
12. Object, Property Status and Control:
    a. Provide a method to view, edit if applicable, the status of any object and property in the system.
    b. Status Available by the Following Methods:
        1) Menu.
        2) Graphics.
        3) Custom Programs.
13. Reports and Logs:
    a. Reporting Package:
        1) Allows operator to select, modify, or create reports.
        2) Definable as to data content, format, interval, and date.
        3) Archivable to hard disk.
    b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
    c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
    d. Set to be printed on operator command or specific time(s).
14. Reports:
    a. Standard:
        1) Objects with current values.
        2) Current alarms not locked out.
        3) Disabled and overridden objects, points and SNVTs.
        4) Objects in manual or automatic alarm lockout.
        5) Objects in alarm lockout currently in alarm.
        6) Logs:
            (a) Alarm History.
            (b) System messages.
            (c) System events.
            (d) Trends.
    b. Custom:
        1) Daily.
        2) Weekly.
        3) Monthly.
        4) Annual.
        5) Time and date stamped.
        6) Title.

7) Facility name.
c. Tenant Override:
1) Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.
2) Annual report showing override usage on a monthly basis.
d. Electrical, Fuel, and Weather:
1) Electrical Meter(s):
(a) Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.
(b) Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.
2) Fuel Meter(s):
(a) Monthly showing daily natural gas consumption for each meter.
(b) Annual summary showing monthly consumption for each meter.
3) Weather:
(a) Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.
e. Daily Operating Condition of Chiller(s) Based on ASHRAE Std 147:
1) Chilled water inlet and outlet temperature.
2) Chilled water flow.
3) Chilled water inlet and outlet pressure.
4) Evaporator refrigerant pressure and temperature.
5) Condenser refrigerant pressure and temperature.
6) Condenser refrigerant pressure and liquid temperature.
7) Refrigerant levels.
8) Oil pressure and temperature.
9) Oil level.
10) Compressor refrigerant discharge temperature.
11) Refrigerant suction temperature.
12) Addition of refrigerant.
13) Addition of oil.
14) Motor amperes per phase.
15) Motor volts per phase.
16) Ambient temperature (dry-bulb and wet-bulb).
17) Date and time logged.

C. Applications Editors:
1. Provide editing software for each system application.
2. Downloaded application is executed at controller panel.
3. Full screen editor for each application allows operator to view and change:
a. Configuration.
b. Name.
c. Control parameters.
d. Set-points.
4. Scheduling:
a. Monthly calendar indicates schedules, holidays, and exceptions.
b. Allows several related objects to be scheduled and copied to other objects or dates.
c. Start and stop times adjustable from master schedule.
5. Custom Application Programming:
a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
b. Programming Features:
1) English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.

2) Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
3) Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.
4) Allows the development of independently, executing, program modules designed to enable and disable other modules.
5) Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.
6) Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
7) Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.
8) Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values cab be used in IF/THEN comparisons, calculations, programming statement logic, etc.
9) Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

2.10 CONTROLLER SOFTWARE

A. All applications reside and operate in the system controllers and editing of all applications occurs at the interface.

B. System Security:
   1. User access secured via user passwords and user names.
   2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
   3. User Log On/Log Off attempts are recorded.
   4. Automatic Log Off occurs following the last keystroke after a user defined delay time.

C. Object or Object Group Scheduling:
   1. Weekly Schedules Based on Separate, Daily Schedules:
      a. Include start, stop, optimal stop, and night economizer.
      b. 10 events maximum per schedule.
      c. Start/stop times adjustable for each group object.
   2. Exception Schedules:
      a. Based on any day of the year.
      b. Defined up to one year in advance.
      c. Automatically discarded and replaced with standard schedule for that day of the week upon execution.
   3. Holiday or Special Schedules:
      a. Capability to define up to 99 schedules.
      b. Repeated annually.
      c. Length of each period is operator defined.

D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.

E. Alarms:
   1. Binary object is set to alarm based on the operator specified state.
   2. Analog object to have high/low alarm limits.
   3. All alarming is capable of being automatically and manually disabled.
   4. Alarm Reporting:
      a. Operator determines action to be taken for alarm event.
      b. Reporting Options:

1) Start programs.
2) Print.
3) Logged.
4) Custom messaging.
5) Graphical displays.

F. Demand Limiting:
1. Building power consumption monitored from signals generated by a pulse generator, mounted at the building power meter.
2. Demand limit controlled via load shedding or load restoration in a predetermined and predictive manner.
3. Demand Reduction Methods:
a. Supply air temperature reset.
b. Space temperature set-point reset.
c. Equipment off/on prioritization.
4. Relevant variables that influence demand limiting control are based on the power company methodology for computing demand charges.
5. Operator On-Line Changes Allowed:
a. Addition and deletion of loads controlled.
b. Changes in demand intervals.
c. Changes in demand limit for meter(s).
d. Maximum equipment shutoff time.
e. Minimum equipment shutoff time.
f. Select rotational or sequential shedding and restoring.
g. Shed/restore priority.
6. Information and Reports available Hourly, Daily, and Monthly:
a. Total electric consumption.
b. Peak demand.
c. Date and time of peak demand.
d. Daily peak demand.

G. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

H. Sequencing: Application software based upon specified sequences of operation in Section 23 0993.

I. PID Control Characteristics:
1. Direct or reverse action.
2. Anti-windup.
3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
4. User selectable controlled variable, set-point, and PED gains.

J. Staggered Start Application:
1. Prevents all controlled equipment from simultaneously restarting after power outage.
2. Order of equipment startup is user selectable.

K. Energy Calculations:
1. Accumulated instantaneous power or flow rates are converted to energy use data.
2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

L. Anti-Short Cycling:
1. All binary output objects protected from short-cycling.
2. Allows minimum on-time and off-time to be selected.

M. On-Off Control with Differential:

1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

N. Run-Time Totalization:
1. Totalize run-times for all binary input objects.
2. Provides operator with capability to assign high run-time alarm.

2.11 HVAC CONTROL PROGRAMS

A. General:
1. Support Inch-pounds and SI (metric) units of measurement.
2. Identify each HVAC Control system.

B. Optimal Run Time:
1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
4. Use outside air temperature to determine early shut down with ventilation override.
5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.
6. Operator commands:
   a. Define term schedule.
   b. Add/delete fan status point.
   c. Add/delete outside air temperature point.
   d. Add/delete mass temperature point.
   e. Define heating/cooling parameters.
   f. Define mass sensor heating/cooling parameters.
   g. Lock/unlock program.
   h. Request optimal run time control summary.
   i. Request optimal run time mass temperature summary.
   j. Request HVAC point summary.
   k. Request HVAC saving profile summary.
7. Control Summary:
   a. HVAC Control system begin/end status.
   b. Optimal run time lock/unlock control status.
   c. Heating/cooling mode status.
   d. Optimal run time schedule.
   e. Start/Stop times.
   f. Selected mass temperature point ID.
   g. Optimal run time system normal start times.
   h. Occupancy and vacancy times.
   i. Optimal run time system heating/cooling mode parameters.
8. Mass temperature summary:
   a. Mass temperature point type and ID.
   b. Desired and current mass temperature values.
   c. Calculated warm-up/cool-down time for each mass temperature.
   d. Heating/cooling season limits.
   e. Break point temperature for cooling mode analysis.
9. HVAC point summary:
   a. Control system identifier and status.
   b. Point ID and status.
   c. Outside air temperature point ID and status.
   d. Mass temperature point ID and point.
   e. Calculated optimal start and stop times.

f. Period start.

C. Supply Air Reset:
1. Monitor heating and cooling loads in building spaces, terminal reheat systems, both hot deck and cold deck temperatures on dual duct and multizone systems, single zone unit discharge temperatures.
2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
a. Raising cooling temperatures to highest possible value.
b. Reducing heating temperatures to lowest possible level.
3. Operator commands:
a. Add/delete fan status point.
b. Lock/unlock program.
c. Request HVAC point summary.
d. Add/Delete discharge controller point.
e. Define discharge controller parameters.
f. Add/delete air flow rate.
g. Define space load and load parameters.
h. Request space load summary.
4. Control summary:
a. HVAC control system status (begin/end).
b. Supply air reset system status.
c. Optimal run time system status.
d. Heating and cooling loop.
e. High/low limits.
f. Deadband.
g. Response timer.
h. Reset times.
5. Space load summary:
a. HVAC system status.
b. Optimal run time status.
c. Heating/cooling loop status.
d. Space load point ID.
e. Current space load point value.
f. Control heat/cool limited.
g. Gain factor.
h. Calculated reset values.
i. Fan status point ID and status.
j. Control discharge temperature point ID and status.
k. Space load point ID and status.
l. Air flow rate point ID and status.

D. Enthalpy Switchover:
1. Calculate outside and return air enthalpy using measured temperature and relative humidity; determine energy expended and control outside and return air dampers.
2. Operator commands:
a. Add/delete fan status point.
b. Add/delete outside air temperature point.
c. Add/delete discharge controller point.
d. Define discharge controller parameters.
e. Add/delete return air temperature point.
f. Add/delete outside air dew point/humidity point.
g. Add/delete return air dew point/humidity point.
h. Add/delete damper switch.
i. Add/delete minimum outside air.
j. Add/delete atmospheric pressure.

k. Add/delete heating override switch.
l. Add/delete evaporative cooling switch.
m. Add/delete air flow rate.
n. Define enthalpy deadband.
o. Lock/unlock program.
p. Request control summary.
q. Request HVAC point summary.

3. Control summary:
   a. HVAC control system begin/end status.
   b. Enthalpy switchover optimal system status.
   c. Optimal return time system status.
   d. Current outside air enthalpy.
   e. Calculated mixed air enthalpy.
   f. Calculated cooling cool enthalpy using outside air.
   g. Calculated cooling cool enthalpy using mixed air.
   h. Calculated enthalpy difference.
   i. Enthalpy switchover deadband.
   j. Status of damper mode switch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 0993.

C. Demonstrate full remote web access outside the Owner's firewall as part of demonstration. provide all necessary hardware and obtain all necessary permissions to accomplish this demonstration of permanent remote access.

D. Provide a UPS for each controller and buss device that will operate the systems for 3 hours.

E. Provide conduit and electrical wiring in accordance with Section 26 0583. Electrical material and installation shall be in accordance with appropriate requirements of NFPA 72 and project requirements.

F. All programming of the new components will be by factory trained controls personnel. programming of the front end will be performed by Trane factory trained and certified personnel. acceptance of suitability of personnel performing programming and startup will be at the sole discretion of the Owner and Engineer. replacement personnel will be provided upon the request of the Owner or Engineer at any time in the project or warranty period.

G. Provide programmer level acces to all systems for Engineer via remote web interface.

3.03 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

B. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.

C. Provide basic operator training for 10 persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 24 hours dedicated instructor time. Provide training on site.

D. Provide basic operation training to Owner's staff on display, alarm and status descriptors, requesting data, excecution of commands and request of logs. Training to be a minimum of 2 hours. Training shall be on site, witnessed by the Engineer, and a attendance log will be taken and turned over to the Owner and Engineer.

3.04 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate complete and operating system to Owner.

B. Fully test the reliability and stability of the WCN, as configured in the original layout, and provide a detailed report indicating compliance with the standards set forth for the project, for review and acceptance by the Engineer. Engineer may witness testing.

C. Demonstrate the sufficiency of the WCN density required for the project, including the robustness of the WCN in terms of device failure/abandonment, to the Engineer, for review and acceptance.

3.05 MAINTENANCE

A. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.

B. Provide two complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

C. Provide complete service of systems, including call backs. Make minimum of [four] complete normal inspections of approximately [five] hours duration, during the course of the warranty period, in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

END OF SECTION

SECTION 23 0993

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 23 0923 - Direct-Digital Control System for HVAC.

B. Section 23 0913 - Instrumentation and Control Devices for HVAC.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SEE ATTACHED SEQUENCE OF OPERATION FOLLOWING THIS SECTION.

END OF SECTION

HVAC SEQUENCE OF OPERATION
BUILDING 25 HVAC RENOVATIONS

Replacement of Existing System:

The project will replace the existing BAS, with all equipment currently on the BAS incorporate into the new system. In terms of the sequence of operation, the intent is to replicate the function of the existing BAS as defined in the reference material from the original and supplemented/ clarified in this sequence. During bidding, bidders are highly encouraged to review the requirements and ask for clarifications related to this requirement. Operators such as for valves and dampers may be re-used if compatible with the new system. Temperature sensors, pressure sensors, and water flow meters will be replaced.

Building Automation System:

Provide and Install a replacement for the existing building BAS system. Requirement is for a complete, new, building automation and control system (BAS) to meet the needs of the HVAC system equipment currently operating the building, and limited new equipment to be added. The building control system will utilize a building level controller and associated devices to control a mixture of boilers, water source heat pumps, fluid cooler, associated pumps, MAU with ERV, and supporting equipment in accordance with the sequences of operation via a wired control system network buss. All system set points will be adjustable, all input and output states will be capable of being overridden..

Summary:

This sequence provides the roadmap to the BAS for this project. There may be requirements in the plans and specifications which are not in this sequence, they will be in full effect for the project. Where they may conflict, the Engineer will be the sole authority of interpretation and discrepancy resolution. Provide a replacement for the existing building BAS system. It will be one, stand-alone, networked, building automation and control system for the project. The control system is to be a microprocessor based system utilizing DDC control and electric actuation. The BAS will integrate into the Owner's centralized monitoring system, which is a Trane ensemble system, operating on the Owner's server deployment, through the Owner's secure executive network. Trane Ensemble is basis of design.

Additionally, full operability Web (internet) interface will permit the Owner to read and acknowledge alarms, adjust the occupancy schedule, set points, trend data, review overall system status, all remotely. New controls shall be tied into owners existing Trane Ensemble System for a seamless user interface. Hotlinks/targets to other applications and/or separate web pages will be NOT accepted as a "seamless" interface to the Ensemble System. Provide long term data logging and archiving of data for a minimum of 3 years. All data, alarms, and graphics shall be available for user interface from both local workstation(s) as well as mobile devices through either a mobile browser and/or mobile app. BAS shall provide any necessary controls hardware and/or software upgrades to the existing Ensemble System to meet the spec requirements of this project. The Internet interface will permit monitoring and control from the central location over a secure Internet connection is to be included in the building BAS system. All

programming, devices, wiring, etc., required to access the BAS system through the web interface is included in this project.

The building level controller (BLC) and individual controllers must be fully capable of and programmed for operating independently of the Web based monitoring system and the building must continue to operate on loss of the BLC.

The existing BAS system will be replaced, both in terms of controls equipment, control buss wiring (pathway may be re-used), and coding to meet the performance requirements of this project. Such coding may have to be custom to meet the requirements, and is included in the project. The BAS programming is expected to be an interactive process between the Engineer and the controls contractor. Tweaks and adjustments to the sequences to optimize the configuration, operation, and graphics are anticipated and will be part of the BAS requirement and warranty. All controls will be installed and programmed to the satisfaction of the Engineer. Proximate units and devices may be operated from common control panels wherever possible to minimize system architecture repetition but BAS system manufacturer's installed unitary controllers on smaller equipment are preferred where possible but all must continue to operate on loss of the BLC.

A hybrid wired/wireless will be installed for the BAS. The entire building control buss will be replaced with new wiring, no buss wiring will be re-used. Existing conduits may be re-used, as may control panels if such use does not interfere with simultaneous operation of both systems. The wiring will be installed tight to deck above ceilings and securely anchored to building structure using bridle rings every 10'. It will be routed only parallel and perpendicular to walls and floor, and will routed up and down from above to each device utilizing foil shielded plenum rated cabling. Where exposed in spaces or mechanical rooms it will be routed in conduits. Wiring will be point to point on devices terminal strips as required by system architecture and no intermediate splices will be permitted. At least two busses per floor will be installed to prevent loss of the entire floor or building due to a buss failure and will be oriented generally east-west.

No existing control devices or wiring will be abandoned in place. If not re-used, it will be removed in its entirety. All on site startup and assistance in startup, TAB, or training will be performed by the installing and programming technician. No third party may be used for installation or support work.

Phasing:

The existing BAS must remain in in place an operable while the new system is installed. New devices and control panels must be in place and operation before the existing panels may be removed. The new BAS systems installation must be planned such that the new controls may be brought online in an orderly planned manner but must not resulting significant negative impact on the building occupants. The sequence of the work will be submitted in a written plan and coordinated with the Owner and Engineer, who will review and ultimately accept the plan for execution.

Partial System DDC Points List: (list is minimum, provide all points necessary to accomplish the sequence of operation)

This project involves replacement of water source heat pumps with the addition of a rooftop make-up air unit. While much of the equipment will have their own unitary controls, the equipment will integrate into a new facility wide building automation system (BAS). As a minimum, the TRANE BAS will be able to monitor and adjust the following set points:

A. Boiler Status
B. Boiler Alarm
C. Boiler CO Alarm
D. Boiler Pump Status
E. Boiler Pump Alarm
F. Boiler Inlet Temperature
G. Boiler Outlet Temperature
H. HHW Water Loop Temperature
I. Fluid Cooler Status
J. Fluid Cooler Alarm
K. Fluid Cooler Fan Status
L. Fluid Cooler Fan Alarm
M. Fluid Cooler Pump Status
N. Fluid Cooler Pump Alarm
O. Fluid Cooler Inlet Temperature
P. Fluid Cooler Outlet Temperature
Q. WSHP Status
R. WSHP Alarm
S. WSHP Mode (Cool/Heat/Dehumidification)
T. WSHP Inlet Temperature
U. WSHP Discharge Temp
V. WSHP Fan (Status, Speed, Alarm)
W. WSHP OA Damper Position
X. WSHP CO_2 sensor
Y. MAU Supply Fan (Status, Speed, Alarm)
Z. MAU Exhaust Fan (Status, Speed, Alarm)
AA. MAU Supply Air Temperature
BB. MAU Alarm
CC. MAU Operating Mode (Coo/Heat)
DD. Duct Static Pressure
EE. Building Space Pressure (Interior)
FF. Building Space Pressure (Exterior)
GG. Relief Damper Position
HH. HHW Pumps Status
II. HHW Pump Alarm
JJ. HHW Pump
KK. HHW Pump Loop Temperature

Startup/ Testing, TAB, and Training:

Startup and testing of the BAS will be performed separate from TAB and Training and will be scheduled as independent events on different days. BAS installer will be available ***on site*** to assist in equipment startup. The Engineer will be given all passwords to the BAS, including installer/ technician level passwords for full, unfettered access to the BAS. Such passwords may not be changed without the Engineer and Owner's consent. The Engineer will be provided with remote web based access to the BAS for review and evaluation during the project.

Testing and Balancing (TAB)

The project will require a complete balance of the air and water systems. A requirement of the project is for the contractor to retain the services of a third party professional balancer to perform TAB of both the air and water systems of Building #25. The contractor is to submit the qualifications of the agency performing TAB for review and approval of the Engineer. The submission should include qualifications and a proposed plan for performing TAB. The Engineer will witness all TAB activities on site. The contractor is required to schedule TAB with the Engineer and provide a minimum two weeks' notice. The air system TAB will include profiling the MAU supply fan, exhaust fan, and air dampers. The dampers, balancing and relief, will be measured, adjusted, and set with their positions noted. Each WSHP supply, return, and outside air (OA) air flows are indicated on the project drawings. Air flows will be measured and adjusted to meet the air flow criteria. Water system TAB will include setting ad adjusting flows to all WSHPs in addition to making adjustments as necessary to the existing building loop pumps and balancing and control valves for the revised water flows. As the project will occur in phases, multiple site visits to perform TAB may be required.

Water Source Heat Pump (WSHP) Control

The WSHPs will be provided with onboard unitary controls which will have an open source BACNET control protocol which will be able to integrate to the new BAS. The BAS will be able to view and modify alarms, set points, schedules, and operating modes. The controller will have the ability to fully communicate to the building wide BAS and software in use in Charleston, Each WHSP will be provided with a zone thermostat and humidity sensor. The WSHP will maintain space temperature using heating or cooling to meet the following set points:

A. Heating
    a. Occupied: 70ºF
    b. Unoccupied: 60ºF
B. Cooling
    a. Occupied: 74ºF, 55% RH
    b. Unoccupied: 80ºF, 55% RH

The WHSP internal control sequence will control fan speed, compressor stages of cooling and heating, and hot gas reheat. When the humidistat calls for dehumidification,

the WSHP will run in cooling and utilize hot gas reheat and fan speed modulation to achieve the humidity set point, returning to cooling mode once the humidity threshold is satisfied. Each heat pump system will have a setback bypass button to override setback for an adjustable time (typically 2 hours), activation of the button must give positive feedback of entering bypass mode

WSHPs will also operate with demand control ventilation (DCV) off of its integral controls. Each WSHP will have an outside air duct tap served by the make-up air unit with a powered volume control damper. The control damper will have its minimum and maximum positions set during TAB. A CO_2 sensor will be located in each return duct tap. The return duct mounted OA damper will default to its minimum open position until the CO_2 sensor measures above the minimum set point. The BAS will proportionally open the damper to its maximum position. Once CO_2 levels are reduced, the damper will proportionally close until it reaches the minimum ventilation position. The BAS will be able to view and adjust CO_2 set points, view OA damper position, and override damper positions to its maximum/minimum open settings.

Boiler Control

There is an existing HTP Modcon 1700 double stack natural gas boiler located in the boiler room on Level 7. The boiler also has an extraction pump to the main building loop. This boiler has unitary controls which the BAS will monitor. The boiler will fire, modulate, and operate the extraction pump to maintain a loop temperature reading from a water temperature sensor in the building loop piping. The building loop temperature set point and occupancy scheduled may be adjusted by the BAS. While the BAS can monitor status and alarm, the boiler will fire and modulate off of its integral control sequence. The BAS will not seize control of the boiler firing sequence or modulation algorithm. A carbon monoxide detector is located in the boiler room and will transmit any alarms through the BAS.

Hot Water/ Chilled Water Pumps – Constant Volume Pumping

The existing HHW pumps, which are constant volume, will be operated by a BAS panel located in the mechanical room, controlling motor starters for all constant volume pumps. The control panel will operate any parallel pumps lead/ lag with time equalization. The panel will start/ stop the pumps and monitor the status of the lead pump and, in the event of failure, start the lag pump; where a lag pump exists. The pumps are never to operate simultaneously. The BAS will monitor the supply and return temperatures of each source, the loop before and after the source, and the supply and return temperature of the system supply and return.

Make-up Air Unit (MAU) Control

A new gas fired rooftop make up air unit with DX cooling and energy recovery will be installed on the roof on Level 7. The unit will operate primarily off of its internal control sequence. The MAU will have both a supply and exhaust fan, each with an integral variable frequency drive (VFD). The MAU will operate off of a schedule, set by the BAS, to maintain minimum ventilation requirements. Duct static pressure sensors will be installed in the supply duct from the MAU on each floor. The supply fan VFD will adjust

the supply fan speed to maintain the duct static pressure set point. The MAU exhaust will capture building exhaust air and also building relief air. Each floor's exhaust air ductwork trunk will have a tap in the ceiling plenum with a manual balance damper and a powered relief damper, controlled by the BAS. The balance dampers will be set to the specific relief airflows indicated on the drawings. Space building pressure sensors will be installed on each floor and on the building exterior for relief damper reference. The final locations will be determined by the Engineer. The pressure sensors will compare the interior and exterior pressures to modulate the powered relief dampers to maintain a slight positive (~0.05 in wc) pressure inside the building. The MAU exhaust fan VFD will adjust the speed of the exhaust fan to maintain the building pressure set point. The MAU will operate in either heating or cooling modes, based on a air temperature sensor installed in the supply air duct, to a discharge air temperature of 70ºF in cooling and 65ºF in heating. The BAS will be able to view and adjust the set points of the supply duct static pressure, building air pressure, heating discharge air temperature, and cooling discharge air temperatures, MAU operating status, and adjust operating schedules.

Fluid Cooler Control

The has an existing fluid cooler located on the roof on Level 7. The fluid cooler will operate on its internal controller to control both the integral fan VFD and spray pump motor. The controller will incorporate a BACNET communications card. The BAS will remote enable the fluid cooler for operation when the boiler is off. The BAS will control slow acting motorized 2" ball valves for blow down. The BAS will control a basin fill valve located in the mechanical room on the cooler domestic feed which acts reversely with both a winter basin drain and a feed water drain located at the tower to prevent the feed water line from freezing. The feed water system will operate to drain the fluid cooler basin at 34 degrees and fill it at 39 degrees.

The fluid cooler is not piped directly to the water source system but is indirectly coupled to the system through a plate and frame heat exchanger which incorporates glycol. This heat exchanger is in addition to the coil in the fluid cooler tower. This heat rejection loop has a variable volume pump, controlled by a VFD, which is enabled whenever the fluid cooler is enabled. It modulates to maintain loop supply set point.

Email Notification:

An inherent function of the BAS will be that it can email multiple email addresses on selected alarms by alarm priority level. The new BAS sending voice messages will not be considered as a substitute or approved equal for this requirement.

End of Sequence of Operations

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water and glycol piping, above grade.
C. Chilled water piping, above grade.
D. Equipment drains and overflows.
E. Pipe hangers and supports.
F. Unions, flanges, mechanical couplings, and dielectric connections.
G. Valves:
   1. Globe or angle valves.
   2. Ball valves.
   3. Butterfly valves.

1.02 RELATED REQUIREMENTS

A. Section 23 0548 - Vibration and Seismic Controls for HVAC.
B. Section 23 0553 - Identification for HVAC Piping and Equipment.
C. Section 23 2114 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
C. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.
D. ASME B31.9 - Building Services Piping; 2014.
E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
F. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service; 2014.
G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
H. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
I. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
L. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
M. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications; 2012.
N. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.
O. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.
P. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2006.
Q. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

R. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).

S. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

T. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.

U. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

V. AWWA C606 - Grooved and Shouldered Joints; 2011.

W. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalog information.
   3. Indicate valve data and ratings.
   4. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

C. Project Record Documents: Record actual locations of valves.

D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Valve Repacking Kits: One for each type and size of valve.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

C. Date stamp all castings used for coupling housings, fittings, valve bodies, etc. for quality assurance and traceability.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Engineer.

b. Grooved mechanical connections and joints comply with AWWA C606.
   1) Ductile Iron: Comply with ASTM A536, Grade 65-45-12.
   2) Steel: Comply with ASTM A106/A106M, Grade B or ASTM A53/A53M.
c. Use rigid joints unless otherwise indicated.
d. Use gaskets of molded synthetic rubber with central cavity, pressure-responsive configuration, and complying with ASTM D2000, Grade 2CA615A15B44F17Z for circulating medium up to maximum 230 degrees F or Grade M3BA610A15B44Z for circulating medium up to maximum 200 degrees F.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:
1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
2. On discharge of condenser water pumps, use spring-loaded check valves.
3. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
4. For throttling, bypass, or manual flow control services, use ball or butterfly valves.
5. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
6. In heating water, chilled water, or condenser water systems, butterfly valves may be used interchangeably with gate and globe valves.
7. For shut-off and to isolate parts of systems or vertical risers, use ball valves.
8. For throttling service, use plug cocks. Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
   a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
   c. Braze: 1 BCuP copper/silver alloy.
2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
4. Copper is only allowed on piping 2 inches and smaller.

2.03 CHILLED WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:
1. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), hard drawn; using one of the following joint types:

1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22, solder wrought copper fittings.
   a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   b. Braze: 1 BCuP copper/silver alloy.
2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
4. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
5. Copper in only allowed on piping 2 inches and under.

2.04 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

B. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   6. Vertical Support: Steel riser clamp.
   7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.06 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Mechanical Couplings: Comply with ASTM F1476.
   3. Housing Material: Ductile iron, galvanized complying with ASTM A536.
   4. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F.
   5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.

6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
7. Manufacturers:
   a. Victaulic Company: www.victaulic.com.
   b. Gruv Lok: www.anvilintl.com.
   c. Substitutions: See Section 01 6000 - Product Requirements.

D. Dielectric Connections:
1. Waterways:
   a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
   b. Dry insulation barrier able to withstand 600-volt breakdown test.
   c. Construct of galvanized steel with threaded end connections to match connecting piping.
   d. Suitable for the required operating pressures and temperatures.
2. Flanges:
   a. Dielectric flanges with same pressure ratings as standard flanges.
   b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
   c. Dry insulation barrier able to withstand 600-volt breakdown test.
   d. Construct of galvanized steel with threaded end connections to match connecting piping.
   e. Suitable for the required operating pressures and temperatures.

2.07 GLOBE OR ANGLE VALVES

A. Manufacturers:
1. Conbraco Industries: www.apollovalves.com.
2. Nibco, Inc: www.nibco.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Up To and Including 2 Inches:
1. Bronze body, bronze trim, union bonnet, rising stem and handwheel, inside screw with backseating stem, renewable composition disc and bronze seat, solder ends.

C. Over 2 Inches:
1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, rotating plug-type disc with renewable seat ring and disc, flanged ends.

2.08 BALL VALVES

A. Manufacturers:
1. Conbraco Industries: www.apollovalves.com.
2. Nibco, Inc: www.nibco.com.
3. Victaulic Company: www.victaulic.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Up To and Including 2 Inches:
1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

C. Over 2 Inches:
1. Ductile iron body, chrome plated stainless steel ball, teflon or Virgin TFE seat and stuffing box seals, lever handle or gear operated, flanged ends, rated to 800 psi.

2.09 BUTTERFLY VALVES

A. Manufacturers:
1. Conbraco Industries: www.apollovalves.com.
2. Nibco, Inc: www.nibco.com.
3. Victaulic Company: www.victaulic.com.

B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer or grooved ends, extended neck.

C. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.

D. Stem: Stainless steel with stem offset from the centerline to provide full 360-degree circumferential setting.

E. Operator: 10 position lever handle.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to 1 requirements. Install chilled water piping to ASME B31.5 requirements.

C. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

D. Route piping in orderly manner, parallel to building structure, and maintain gradient.

E. Install piping to conserve building space and to avoid interference with use of space.

F. Group piping whenever practical at common elevations.

G. Sleeve pipe passing through partitions, walls, and floors.

H. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

I. Slope piping and arrange to drain at low points.

J. Grooved Joints:
   1. Install in accordance with the manufacturer's latest published installation instructions.
   2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

K. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

L. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   6. Provide copper plated hangers and supports for copper piping.

M. Provide clearance in hangers and from structure and other equipment for installation of and access to valves and fittings.

N. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.

B. Hanger Spacing for Steel Piping.
   1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
   2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
   5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.

B. Strainers.

C. Balancing valves.

D. Relief valves.

E. Glycol system.

1.02 RELATED REQUIREMENTS

A. Section 23 2113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

C. Project Record Documents: Record actual locations of flow controls.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements for additional provisions.
   2. Extra Glycol Solution: One container, 1 gallon size.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

A. Manufacturers:
   1. ITT Bell & Gossett: www.bellgossett.com/#sle.
   2. Taco, Inc: www.taco-hvac.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Manual Type: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

D. Maximum Fluid Pressure: 150 psi.

E. Maximum Fluid Temperature: 250 degrees F.

2.02 STRAINERS

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Y-Type, Size 2 inch and Smaller:
1. Threaded body with 1/32 inch stainless steel perforated screen and blow-off plug for minimum working pressure of 175 psi.

2.03 BALANCING VALVES

A. Manufacturers:
1. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Size 2 inch and Smaller:
1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded, soldered, or sweat connections.
2. Metal construction materials consist of bronze or brass.
3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.

2.04 RELIEF VALVES

A. Manufacturers:
1. ITT Bell & Gossett: www.bellgossett.com/#sle.
2. Conbraco Industries: www.apollovalves.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.05 GLYCOL SYSTEM

A. Glycol Solution:
1. Water-based solution mix containing 30 percent propylene glycol by volume required for cooling or heating system operating temperature range.
2. Cooling or heating System Operating Temperature Range: Between freezing and boiling points of 3 and 220 degees F at 14.7 psia.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Provide manual air vents at system high points and as indicated.

C. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

D. Install tee prior to inlet on automatic air vents. Provide pipe and manual air vent in parallel with automatic air vent.

E. Provide valved drain and hose connection on strainer blowdown connection.

F. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.

G. Pipe relief valve outlet to nearest floor drain.

H. Perform tests determining strength of glycol and water solution and submit written test results.

I. Replace any glycol lost during installation and install additional glycol as necessary to fill the hydronic piping system.

3.02 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.

C. Perform monthly visit to make glycol fluid concentration analysis on site with refractive index measurement instrument. Report findings in detail in writing, including analysis and amounts of glycol or water added.

D. Explain corrective actions to Owner's maintenance personnel in person.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Nonmetal ductwork.

1.02 RELATED REQUIREMENTS

A. Section 23 0713 - Duct Insulation: External insulation and duct liner.

B. Section 23 3300 - Air Duct Accessories.

C. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2013.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

F. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with 1 standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (System with Cooling Coils): 1/2 inch wg pressure class, galvanized steel.

D. Return and Relief: 1/2 inch wg pressure class, galvanized steel.

E. General Exhaust: 1/2 inch wg pressure class, galvanized steel.

F. Outside Air Intake: 1/2 inch wg pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   2. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   3. Other Types: As required.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

G. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Flexible Ducts: Multiple layers of aluminum laminate supported by helically wound spring steel wire.
   1. UL labeled.
   2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   3. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
   4. Maximum Velocity: 4000 fpm.
   5. Temperature Range: Minus 20 degrees F to 210 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

C. Flexible Ducts: Connect to metal ducts with mechanical fastener.

D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with

spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

G. Use double nuts and lock washers on threaded rod supports.

H. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

I. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp. Only hard 90s will be used.

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backdraft dampers - metal.

B. Combination fire and smoke dampers.

C. Duct access doors.

D. Duct test holes.

E. Fire dampers.

F. Smoke dampers.

G. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

B. NFPA 92 - Standard for Smoke Control Systems; 2015.

C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

E. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

F. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

G. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Project Record Drawings: Record actual locations of access doors and test holes.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

C. Installer Qualifications: Fire and smoke dampers are to be installed by a Licensed Fire Protection Damper Technician in the state of West Virginia. Contractor is to submit proof of licensure to Authority Having Jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.02 COMBINATION FIRE AND SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

B. Provide factory sleeve and collar for each damper.

C. Multiple Blade Dampers: Fabricate with 16 gauge, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

D. Operators: UL listed and labelled spring return pneumatic type suitable for operation on 0-20 psig instrument air. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.

E. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.03 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Multiple Blade Dampers: 16 gauge, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

C. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.06 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

B. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by pneumatic actuator.

C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.07 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

1. Blade: 18 gauge, 0.0478 inch, minimum.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts. Install minimum 2 duct widths from duct take-off.

I. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 3423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall exhausters.

1.02 RELATED REQUIREMENTS

A. Section 23 0548 - Vibration and Seismic Controls for HVAC.

B. Section 23 3300 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; http://www.amca.org/certified/search/company.aspx.

B. AMCA 99 - Standards Handbook; 2010.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.

D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.

I. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Greenheck: www.greenheck.com.

B. Loren Cook Company: www.lorencook.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: Comply with AMCA 204.

B. Performance Ratings: Comply with AMCA 210, bearing certified rating seal.

C. Sound Ratings: Comply with AMCA 301, tested to AMCA 300, bearing certified sound ratings seal.

D. Fabrication: Comply with AMCA 99.

E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

F. Enclosed Safety Switches: Comply with NEMA 250.

G. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.

2.03 WALL EXHAUSTERS

A. Fan Unit: V-belt or direct driven with spun aluminum housing; resiliently mounted motor; 1/2 inch mesh, 0.062 inch thick aluminum wire bird screen.

B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor, and wall mounted multiple speed switch.

C. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

D. Sheaves: For V-belt drives, provide cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide sheaves required for final air balance.

C. Install backdraft dampers on inlet to roof and wall exhausters.

D. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers:

B. Rectangular ceiling diffusers.

C. Round ceiling diffusers.

D. Registers/grilles:
   1. Ceiling-mounted, exhaust and return register/grilles.
   2. Ceiling-mounted, supply register/grilles.
   3. Wall-mounted, exhaust and return register/grilles.

E. Louvers:

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Project Record Documents: Record actual locations of air outlets and inlets.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carnes, a division of Carnes Company Inc: www.carnes.com/#sle.

B. Price Industries: www.price-hvac.com/#sle.

C. Ruskin Company: www.ruskin.com/#sle.

D. Titus: www.titus-hvac.com.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROUND CEILING DIFFUSERS

A. Type: Round, adjustable pattern, stamped or spun, multi-core diffuser to discharge air in 360 degree pattern, with sectorizing baffles where indicated. Diffuser collar shall project not more than 1 inch above ceiling. In plaster ceilings, provide plaster ring and ceiling plaque.

B. Fabrication: Steel with baked enamel finish.

C. Color: As indicated.

D. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.03 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, stamped, multi-core, square, adjustable pattern,stamped, multi-core, square and rectangular, multi-louvered, square and rectangular, adjustable pattern, and multi-louvered diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.

B. Connections: Round.

C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.

D. Fabrication: Steel with baked enamel finish.

E. Color: As indicated.

F. Accessories: Provide radial opposed blade, butterfly, and combination splitter volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, anti-smudging device, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.

2.04 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.

B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.

C. Construction: Made of aluminum extrusions with factory enamel finish.

D. Color: As indicated.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.05 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

D. Color: As indicated.

2.06 WALL SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille with one-way deflection.

B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.

C. Fabrication: Aluminum extrusions with factory clear lacquer finish.

D. Color: As indicated.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.07 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: Steel frames and blades, with factory baked enamel finish.

D. Color: As indicated on the drawings.

E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.08 LOUVERS

A. Type: 4 inch deep frame with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over intake or exhaust end.

B. Fabrication: 16 gauge, 0.0598 inch (1.52 mm) thick galvanized steel thick galvanized steel welded assembly, with factory prime coat finish.

C. Color: To be selected by Engineer from manufacturer's standard range.

D. Mounting: Furnish with interior flat flange for installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

END OF SECTION

SECTION 23 4000
HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disposable panel filters.

1.02 REFERENCE STANDARDS

A. AHRI 850 - Performance Rating of Commercial and Industrial Air Filter Equipment; 2004.

B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.

C. UL 900 - Standard for Air Filter Units; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Filters: One set of each type and size.

PART 2 PRODUCTS

2.01 DISPOSABLE PANEL FILTERS

A. Media: UL 900 Class 2, fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive.
   1. Thickness: 1 inch.

B. Performance Rating:
   1. Face Velocity: 500 FPM.
   2. Initial Resistance: 0.15 inch WG.
   3. Recommended Final Resistance: 0.50 inches WG.

C. Casing: Cardboard frame.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

END OF SECTION

SECTION 23 7433
DEDICATED OUTDOOR AIR UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Direct fired make-up air heater.

B. Cooling coil section and compressor-condenser unit.

C. Controls.

D. Energy Recovery.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping: Natural gas connections.

B. Section 23 0548 - Vibration and Seismic Controls for HVAC.

C. Section 23 3300 - Air Duct Accessories: Flexible duct connections.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.

B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.

C. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; 2010.

D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.

E. NEMA MG 1 - Motors and Generators; 2014.

F. NFPA 54 - National Fuel Gas Code; 2015.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

I. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data with dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.

C. Project Record Documents: Record actual locations of components.

D. Operation And Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

E. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Filters: One set of each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturers warranty for compressor/condenser unit.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation: www.carrier.com.

B. Trane: www.trane.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

A. Comply with NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by 1 as suitable for the purpose specified and indicated.

2.03 MANUFACTURED UNITS

A. Unit: Outdoor unit with refrigeration package. Unit to have supply and exhaust fans utilizing energy recovery ventilation. Unit to be provided with a single point eletrical connection.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207. Testing: ASHRAE Std 23.1.
   2. Performance Ratings: Energy Efficiency Rating (EER)/Coefficient of Performance (COP) not less than requirements of 1.
   3. Heating Capacity: As scheduled.
   4. Cooling Capacity: As scheduled.
   5. Scheduled Performance: 1 Test Conditions.

2.04 FABRICATION

A. Casing and Components: Double wall, G-90 galvanized steel panels, 18 gage, 0.0478 reinforced with structural angles and channels to ensure rigidity; access panels to burner and blower motor assemblies from either side of unit.
   1. Access panels & doors shall be a minimum of 20 gauge sheet metal.
   2. Basepans to be 16 or 18 gauge galvanized steel. All openings to have upturned flanges at least 1/2" in height.
   3. Condensate pan: 20 gauge stainless steel with closed cell neoprene insulation.
   4. Base Rail: Double flanged 12 gauge galvanized steel.

B. Observation Port: On burner section for observing main and pilot flames.

C. Insulation: Neoprene faced glass fiber insulation 2 inch thick on inlet components to burner profile plate.
   1. Basepans to be insulated with 0.375 inch thick closed cell foam insulation.

D. Finish: Heat resistant baked enamel.

E. Outdoor Installation: Weatherproofed casing, with intake louver or hood.

F. Factory sloped condensate drain.

2.05 FILTERS

A. Filters: 2 in thick MERV-8 removable pleated media filters in metal frames installed with hinged access panel.
   1. Dirty Filter Switch: Filter status switch with manual reset as a pressure differential switch and will indicate a dirty filter.

2.06 BURNERS

A. Assembly: For natural gas, capable of modulating turn down ratio of 25:1, including electric modulating main gas valve, motorized shut down valve, main and pilot gas regulators, pilot electric gas valve, manual shut-off valve and pilot adjustment valve.

B. Pilot: Electrically ignited by spark rod through high voltage ignition transformer.

C. Damper: Motorized with end switch to prove position before burner will fire.

2.07 FANS

A. Fan: Statically and dynamically balanced centrifugal fan mounted on solid steel shaft with heavy duty self-aligning pre-lubricated ball bearings and V-belt drive with matching motor sheaves and belts.

B. Electrical Characteristics:
   1. Performance:
      a. As scheduled.
      b. Motors are to never exceed their 90 deg C listed rating for speed and amperage.
      c. Both supply and return fans to be provided with an integral variable frequency drive and capable of operating as both constant volume or modulating control.
      d. Condenser fans to have variable speed VFD to maintain head pressure. In recirculation mode, fan speed control will allow operation oc compressors down to 55°F.

C. Motor: NEMA MG1, Open Drip Proof (ODP).

D. Fan Status Switch: Current sensing switch for each fan to provide proof of airflow.

2.08 CONTROLS

A. Controls: Pre-wire unit for connection of power supply. Field wiring from unit to remote control panel makes unit operative.

B. BACnet, Modbus, and LonWorks protocol capable.

C. Control Panel: On-off-auto switch, summer-winter switch, heat-off-cool switch, indicating lights for supply fan, exhaust fan, pilot operation, burner operation, lockout indication, and clogged filter indication.

D. Night setback and field selectable overrides.

E. 5°F difference between heating and cooling setpoints in accordance with ASHRAE 90.1-2016.

F. Factory sipplied supply air temperature and RH sensors, entering coil or outdoor air temperature and RH sensors, and evaporator leaving temperature sensor.

G. Current alarm list and alarm history list.

H. Minimum compressor run time and minimum off time (5 min).

I. Service run test and diagnotic modes.

J. Dual circuit systems shall have at least one compressor with a mechanical method of capacity modulation controlled with system logic to maintain supply air temperature setpoint.

K. Interlocks: Unit to start when exhaust fan is running. Burner to operate when flow switch located in exhaust duct proves flow. Exhaust fan speed control with inlet damper and burner profile damper to provide dual volume air capacity.

L. Safety Controls:
   1. Compressor lockout protection.
   2. Low pressure and high pressure.
   3. Evaporator coil freeze protection.
   4. Loss of charge.
   5. Condensate overflow.
   6. Unit air supply monitoring to disable if air fault condition occurs.
   7. Fan status switch to disable disable in even of fan drive failure.

M. Induced draft heating section to be provided with the following safety controls:
   1. High temperature limit.
   2. Differential pressure.
   3. Flame rollout.
   4. Flame proving.
   5. Redundant gas valve.

2.09 REFRIGERATION PACKAGE

A. Evaporator Coil: Copper tube aluminum fin coil assembly with alternate row circuiting, and with galvanized drain pan, solid core filter drier, and field adjustable thermostatic expansion valve.

B. Compressor: Four hermetic scroll type, 3600 rpm maximum resiliently with positive lubrication, crankcase heater, high pressure control, low pressure control, motor overload protection, service valves and drier.
   1. Reverse rotation protection.
   2. Lead circuit compressors to have variable speed modulation from 58% - 100% of rated output.
   3. Lag circuit compressors shall be fixed speed with hot gas bypass.

C. Condenser: AHRI 520 aluminum fin and copper tube coil, direct drive axial fan resiliently mounted, galvanized fan guard.

D. Operating Controls: Low voltage, adjustable room thermostat controls compressor and condenser fan to maintain room temperature setting. Provide hot gas bypass on one compressor circuit.

2.10 ENERGY RECOVERY

A. Factory installed enthalpy wheel.
   1. Listed for AHRI Standard 1060.
   2. Corrugated sythetic firbrous media with a dissicant intimately bound and uniformly dispersed throughout.
   3. Dissicant media: Molecular sieve, 4 sngstrom or smaller.
   4. Rotor: Alternating layers of flat and corrugated media.
   5. Wheel Construction:
      a. Fluted or honeycomb geometry to eliminate internal wheel bypass.
      b. Evenly spaced steel spokes with galvanized steel outer band.
      c. Nylon brush type seals.
      d. Galvanized steel wheel cassettes with integral purge section.
      e. Fractional horsepower AC motor via multilink drive belts.

B. Energy Recovery Performances:
   1. As scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install to NFPA 54. Provide connection to fuel gas system; refer to Section 22 1005.

C. Install unit on factory provided rooftop curb. Install vibration isolation per manufactuer's instructions and Section 23 0548.

D. Provide flexible duct connections on inlet and outlet from unit; refer to Section 23 3300.

E. Connect drain pan outlet to nearest building drain system piping.

F. Adjusting: Use plenum static pressure readings against manufacturer calibration chart to adjust primary airflow as other measuring methods will not work.

3.02 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide service and maintenance of units for one year from Date of Substantial Completion.

END OF SECTION

SECTION 23 8126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.

B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.

C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants ; 2019, with Errata (2020).

D. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; 2010.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation: www.carrier.com/#sle.

B. LG

C. Mitsubishi

2.02 SYSTEM DESIGN

A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating: None.
   2. Cooling: Outdoor electric condensing unit with evaporator coils in multiple ductless indoor units ("mini-split").
   3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

B. Performance Requirements: See schedule.

C. Electrical Characteristics:
   1. See schedule
   2. Disconnect Switch: Factory mount disconnect switch on equipment.

2.03 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.

B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturer: System manufacturer.

2.04 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Comply with AHRI 210/240.
   2. Refrigerant: R-410A.

3. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
4. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.

B. Compressor: Hermetic, inverter driven 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.

C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.

D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
1. Provide thermostatic expansion valves.

E. Operating Controls:
1. Control by room thermostat to maintain room temperature setting.
2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION

SECTION 23 8146
WATER-SOURCE UNITARY HEAT PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Horizontal/vertical WSHP.

B. High efficiency, console WSHP.

C. Hose kits and valves.

1.02 RELATED REQUIREMENTS

A. Section 23 0993 - Sequence of Operations for HVAC Controls.

B. Section 23 3300 - Air Duct Accessories.

1.03 ABBREVIATIONS AND ACRONYM

A. BACnet (MSTP): BACnet Master/Slave Token Passing protocol.

B. BAS: Building Automation System.

C. DDC: Direct Digital Control.

D. EFT: Entering Fluid Temperature.

E. EMS: Energy Management System.

F. MERV: Minimum Efficiency Reporting Value.

G. NPT: National Pipe Thread Taper.

H. WSHP: Water Source Heat Pump.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.

B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.

C. ASHRAE Std 13256-1 - Water-Source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-Air and Brine-to-Air Heat Pumps; 1998 (Reaffirmed 2012).

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

F. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

G. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc; Current Edition, Including All Revisions.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

I. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. Product Data: Provide drawings indicating dimensions, rough-in connections, and electrical characteristics and connection requirements.

B. Operation and Maintenance Data: Provide maintenance data, parts lists, controls, and accessories. Include trouble-shooting guide.

C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.01 GENERAL HEAT PUMP FABRICATION REQUIREMENTS

A. Energy Efficiency: ASHRAE Std 90.1 I-P EER and COP ratings, minimum.

B. ASHRAE Std 13256-1, factory-assembled unit including safety-controls, accessories, filters, piping, cables, wires, and precharged with R-410A refrigerant prior to testing.

C. Include marked terminal strip to interface field-mounted components, accessories, and thermostat.

D. Comply with UL 1995; place service and caution labels on unit.

E. Cabinet Assembly:
   1. Construct of zinc-coated, heavy-gauge, galvanized steel with exposed edges rounded.
   2. Finish: Factory apply electrostatic powder paint or baked enamel finish. Coordinate with Engineer for specific color finish requirements of console units or other units installed within occupied spaces.
   3. Provide access panels for inspection, cleaning, and servicing of refrigerant, controls, condensate drain pan, coil, and blower.
   4. Furnish 1-inch, or 3-inch duct flange on open-discharge selections.
   5. Interior Insulation: Minimum 1/2 inch thick, dual density, bonded glass fiber.
   6. Provide flame spread of less than 25, and smoke developed classification of less than 50 in compliance with ASTM E84 and UL 723.
   7. Sound and Noise Suppression:
      a. Mechanical Rooms: 18 gauge, 0.05 inch, minimum.
      b. Occupied Spaces: 16 gauge, 0.06 inch, minimum.
      c. Compressor enclosure lined with 1/2 inch thick insulation.
      d. Include vibration isolation between compressor and heat exchanger.
      e. Include length-wise, unit base stiffeners.
      f. Foam gasket sealant around compressor and end panel perimeter.

F. Blower Section:
   1. Draw-through, forward curved fan, constructed of corrosion-resistant, galvanized material and designed for efficient, quiet operation.
   2. Factory program for both soft start and constant flow output over static pressure range.
   3. Provide preinstalled neutral wire protection when required to support specified fan type.
   4. Motor to include thermal overload protection, quick disconnect plug, and permanently lubricated bearings.
   5. Belt-Driven Motor Requirements: Provide adjustable blower motor/sheave combination device based on indicated flow performance requirements.
   6. Variable Speed Control: Configure controller to maintain adjustable flow setpoint for modulating or speed-switched units.
   7. Fan Turndown: Design control features to allow fan speed reduction to adjustable 50 percent of its capacity when the zone set point temperature is satisfied or when unit runs in fan-only mode.

G. Evaporator Section:
   1. Internally finned, aluminum or copper tubes mechanically bonded to configured aluminum plate fin, corrosion inhibitor coated as indicated.

2. Refrigerant Coil Distributor Assembly: Orifice style with round copper distributor tubes.
3. Thermostatic Expansion Valve: Factory select and install for wide control range.
4. Factory leak test to minimum 450 psi and pressure test to minimum 600 psi.
5. Tubes: Size tubes consistent with coil capacity. Fabricate suction header from rounded copper pipe.
6. Completely evacuate air and charge with proper column of refrigerant prior to shipment.
7. Drain Pan:
   a. Construct of ABS plastic, HDPE, stainless steel, or other corrosion-resistant material and flame rated in accordance with UL 94 when using polymers.
   b. Slope on two planes to pitch condensate to drain connection.
   c. Float Switch: UL 508, rated for protection against condensate overflow, controller connected.

H. Compressor Section:
1. Provide rubber mounting devices located underneath compressor mounting base.
2. Safety Interlocked Devices:
   a. Thermal overload protection.
   b. High pressure switch for protection against excessive discharge pressure.
   c. Low pressure safety for protection against loss of refrigerant charge.

I. Refrigerant Tubing Lines:
1. Tubing made of copper with service pressure ports on high- and low-pressure sides.
2. Free from contaminants and conditions such as drilling fragments, dirt, and oil.
3. Include drier, thermal expansion valve, and other related components.
4. Freeze Protection: 30 degrees F, thermistor based.
5. Insulation: Evaporator and heat exchanger sides; minimum 3/8 inch thick elastomeric insulation.

J. Refrigerant Load Control:
1. Hot-Gas Bypass: Provide to increase heat transfer efficiency at low temperatures.
2. Hot-Gas Reheat Coil:
   a. Humidity Control: Upgrade thermostat to include humidity sensor tied to unit controller for integral dehumidification control.
   b. Coil Assembly: Aluminum or copper tubes mechanically expanded into evenly spaced aluminum fins.
   c. Coil Testing: Proof test at minimum of 1.5 times maximum operating pressure, then leak test at maximum operating pressure.
3. Hot-Water Generator:
   a. Secondary coil or heat exchanger, reversing valve, and accessories.
   b. Storage: Interconnect to existing water heater or external storage tanks.

K. Water-to-Refrigerant Heat Exchanger:
1. Coaxial Type: Provide aluminum or copper tube and fins.
2. Brazed-Plate Type: Stainless steel, with bidirectional liquid line filter drier.
3. Insulate heat exchanger, water lines, and refrigerant suction lines for prevention of condensation at temperatures below 60 degrees F.
4. Provide rubber isolation to heat exchanging device for enhanced sound attenuation.
5. Freeze Protection: 35 degrees F by thermistor sensing.
6. Minimum Working Pressure: 400 psi water side, 600 psi DX side.
7. End Connections: Copper NPT. Provide flow shut-off ball valves.
8. Accessories:
   a. Strainer, PT test plug, and flow regulator.
   b. Unit-controlled, return-water-side solenoid valve.

L. Waterside Economizer Section:
1. Thermostat-controlled, metered, prepiped return air coil with 3-way valve assembly tied and coordinated by unit controller.
2. Provide assembly factory-installed or shipped loose for field installation as indicated.

3. Performance Requirements: As indicated on drawings.
4. Air-to-Water Hydronic Coil:
   a. Aluminum or copper tubes and aluminum plate fin combination.
   b. Accessible, cleanable, dual sloped, noncorrosive drain pan.
   c. Leak test at maximum operating pressure.
   d. Factory proof test at minimum 1.5 times maximum operating pressure.
5. Modulating or position-adjusted control valve to engage and control coil at listed EWT.

M. Filter Section:
1. ASHRAE Std 52.2, minimum efficiency reported value or MERV listing.
2. Filter Box: Provide field-installed return duct-mounted filter housing with side access.

N. Electrical:
1. Provide factory-installed phase loss safety device for 3-phase units.
2. Configure unit for single point connection, include terminal for field-installed components.
3. Include separate holes and knockouts with plastic ferrules for respective electrical and controls wiring.
4. Provide factory mounted disconnect switch.

O. Unit Controls:
1. DDC:
   a. Tested to monitor and handle sequencing functions and other operational modes using field-mounted thermostat and other sensors.
   b. Coordination and Sequencing:
      1) Internal Devices: Include compressors, blower, sensors, switches, valves, safeties, other components.
      2) Field-Installed Devices: Solenoid valves, thermostat, EWT sensors, LWT sensors, load-pump contact, source pump contact, and other devices required for operation.
      3) Safeties: At minimum include anti-short-cycle compressor protection, condensate overflow, refrigerant high pressure, refrigerant low pressure, loss-of-charge, refrigerant freeze protection, and freezestat.

2.02 HORIZONTAL/VERTICAL WATER SOURCE HEAT PUMP

A. Manufacturers:
1. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp.: www.carrier.com.
2. Substitutions: See Section 01 6000 - Product Requirements.
   a. Unit will incorporate hot gas reheat for dehumidification control. No other method of dehumidification control will be considered.

B. General:
1. Factory assemble, pipe, internally wire, test, and fully charge with R-410A refrigerant.
2. Comply with ASHRAE Std 13256-1 and UL 1995.
3. Furnish with filters, factory-installed safety controls, and thermostat field interface strip.
4. System Water Inlet/Outlet Connections: Female NPT copper.
5. Place service and caution labels on the unit in their appropriate locations.
6. Unit will incorporate hot gas reheat for dehumidification control. No other method of dehumidification control will be considered.

C. Cabinet:
1. Construct casing from zinc coated, heavy-gage, G-90 galvanized steel.
2. Provide access panel(s) for inspection and servicing of refrigerant, controls, condensate drain pan, coils, and fan.
3. Insulation:
   a. Factory insulate all panels with minimum 1/2 inch thick, dual density, bonded glass fiber.

b. Exposed Side of Insulation: High density erosion proof material suitable for use in air streams up to 3600 fpm, complying with erosion requirements of UL 181.
c. Provide flame spread of less than 25, and a smoke developed classification of less than 50 per ASTM E84 and UL 723.

4. Include electrical box for the entrance of line voltage with separate knockout for control wiring.
5. Provide factory mounted disconnect switch.

D. Sound Attenuation:
1. Units Close to Occupied Spaces:
a. Minimum 16 gage, 0.0598 inch compressor enclosure.
b. Minimum 16 gage, 0.0598 inch single wall front panel.
c. Lined compressor enclosure with minimum 1/2 inch cabinet insulation.
d. Minimum 12 gage, 0.1046 inch compressor/water-to-refrigerant exchanger pan with 2nd stage of vibration isolation.
e. Water-to-refrigerant heat exchanger vibration isolation.
f. Length-wise unit base stiffeners.
g. Foam gasket sealant around the compressor and end panel perimeter.

E. Water-To-Refrigerant Heat Exchanger:
1. Construction: High quality co-axial coil for maximum heat transfer.
2. Coil Material: Deeply fluted copper to enhance heat transfer and minimize fouling and scaling.
3. Provide rubber isolation to the heat exchanging device for enhanced sound attenuation.
4. Working Pressure:
a. Water Side: Minimum 400 psi.
b. Refrigerant Side: Minimum 600 psi.

F. Drain Pan:
1. Construct of corrosion resistant material and factory insulate to prevent sweating.
2. Slope drain pan on two planes to pitch condensate to drain connection.
3. Flame rated in accordance with UL 94, 5VB.
4. Float Switch: UL 508 rated for protection against condensate overflow.

G. Indoor Fan:
1. Direct Drive Units:
a. Forward-curved style wheel, constructed of corrosion resistant, galvanized material, with multiple speed combinations.
b. Direct Drive Motors:
1) Permanent split capacitor.
2) Sealed bearings not requiring field lubrication.
3) Removable blower inlet ring.
4) Thermal overload protection.
5) Provide standard or high static as indicated.
6) Quick disconnect plug.
7) Constant torque, electronically commutated motor with five pre-programmed torque settings.

H. Filters:
1. Flat filter rack for non-ducted return air applications.
a. 1 inch thick disposable fiberglass filters.
b. MERV: 8, when tested in accordance with ASHRAE Std 52.2.
c. Ducted filter rack for field installation.
d. Average arrestance of 75 percent and dust holding capacity of 26 grams per sq ft.

I. Air-to-Refrigerant Coil:
1. Internally finned, copper tubes mechanically bonded to a configured aluminum plate fin.
2. Coil:

a. Factory leak test to minimum 450 psi and pressure test to minimum 600 psi.
b. Tubes:
1) Completely evacuate air and charge with proper column of refrigerant prior to shipment.
2) Size tubes consistent with coil capacity.
3) Fabricate suction header from rounded copper pipe.
c. Refrigerant Coil Distributor Assembly: Orifice style with round copper distributor tubes.
d. Thermostatic Expansion Valve: Factory select and install for wide control range.

J. Compressor:
1. Two stage hermetic, high efficiency compressor.
2. External Vibration Isolation: Provide rubber mounting devices located underneath compressor mounting base.
3. Safety Devices:
a. Internal thermal overload protection.
b. High pressure switch for protection against excessive discharge pressure.
c. Low pressure safety for protection against loss of refrigerant charge.

K. Refrigerant Circuits:
1. Thermal expansion device.
2. Service pressure ports on high and low pressure sides.
3. Filter driers.
4. Factory installed access fittings on high and low pressure refrigerant lines.
5. Reversing valve: 4 way solenoid activated refrigerant valves. Valves will fail to heating.

L. Refrigerant Tubing:
1. Material: Copper.
2. Free from contaminants and conditions such as drilling fragments, dirt, and oil.
3. Insulation:
a. Water Lines Located in Indoor Air Stream: Minimum 3/8 inch thick elastomeric insulation.
b. Refrigerant Lines Located in Indoor Air Stream Not Over Drain Pan: Minimum 3/8 inch thick elastomeric insulation.

M. Ball Valves: Provide for field installation between the unit and the supply/return lines of the loop to stop water flow to the unit in a maintenance or service situation.

N. Unit Controls:
1. All heat pumps are to be provided will all materials necessary to interconnect to the existing Building Automation System. Provide BACNET Module for each unit and interface to BAS. The existing BAS is Trane TRACER Summit. Verify all materials necessary to connect to BAS prior to bidding.
2. Factory install DDC microprocessor control to sequence the primary unit functions and modes of operation.
3. Controller Capabilities:
a. Standalone operation using electro-mechanical temperature controls or interfacing with a building automation controller using BacNet (MSTP) communication protocols.
b. Publishing to the BAS the Following Monitored Standard Points:
1) Freeze protection refrigerant temperature.
2) High and low refrigerant pressure switches.
3) Condensate overflow sensing.
c. Control the auxiliary heat and other secondary unit functions, as specified in Section 23 0993 - Sequence of Operations for HVAC Controls, over the BAS via the microprocessor.

O. WSHP Open Multiple Protocol Controls.
1. Units shall be provided with an open protocol interface board. All point objects will have the ability to be viewed. The following points must be avalable remotely or at a central station:

a. Space temperature.
b. Leaving water temperature.
c. Discharge air temperature.
d. Command of space temperature setpoint.
e. Cooling status.
f. Heating status.
g. Low temperature sensor alarm.
h. High pressure switch alarm.
i. Fan on / off position of thermostat.
j. Unoccupied / occupied command.
k. Cooling demand.
l. Heating demand.
m. Fan on / auto command.
n. Faul preventions w/ reset.
o. Itemized fault code.

2. Additional open protocol features:
a. Three speed fan control. Unit to operate at the lowest of 3 speeds to achieve set point.
b. Outdoor Air damper position.
c. Modulating OA damper w/ DCV
d. Hot gas reheat solenoid valve.
e. Two position water economizer control.
f. Modulating water economizer control.
g. Single state electric auxillairy heat.
h. Power fail restart delay.
i. Two state compression control.

P. Solid State Safety Circuit:
1. Anti-short cylce time delay on compressor operations.
2. Random start on power up mode.
3. Brown out / surge / power interruption protection.
4. Shutdown on the following faults:
a. High or low refrigerant pressure.
b. Freeze sensors on refrigerant and water coils.
c. Condesate sensor.
5. Alarm output for dry contact enclosure.
6. Automatic intelligent reset: Unit shall automatically reset after a safety shutdown and restart after the anti-short cycle timer and random start timer expire. Should a fault re-occur after 60 minutes following reset, a permanent lockout will occur.
7. Reset of unit at thermostat or disconnect.
8. Ability to defeat time delays for servicing.
9. LED Safety Alarms:
a. High refrigerant pressure.
b. Low refrigerant pressure.
c. Low refrigerant temperature to water coil in heating operation.
d. High condensate level.
e. Brown out / surge / power interruption.

Q. Integral non-fused disconnect switch.

2.03 HIGH EFFICIENCY, CONSOLE WATER SOURCE HEAT PUMP

A. General:
1. Factory assemble, pipe, internally wire, and test operated.
2. Factory assemble, pipe, internally wire, test, and fully charge with R-410A refrigerant.
3. Comply with ASHRAE Std 13256-1 and UL 1995.
4. Furnish with filters, factory-installed safety controls, and thermostat field interface strip.

5. System Water Inlet/Outlet Connections: Female NPT copper.
6. Unit will incorporate hot gas reheat for dehumidification control. No other method of dehumidification control will be considered.
7. Place service and caution labels on the unit in their appropriate locations.

B. Air-to-Refrigerant Coil:
1. Internally finned, copper tubes mechanically bonded to a configured aluminum plate fin.
2. Coil:
a. Factory leak test to minimum 400 psi and pressure test to minimum 400 psi.
b. Tubes:
1) Completely evacuate air and charge with proper column of refrigerant prior to shipment.
2) Size tubes consistent with coil capacity.
3) Fabricate suction header from rounded copper pipe.
c. Refrigerant Coil Distributor Assembly: Orifice style with round copper distributor tubes.
d. Thermostatic Expansion Valve: Factory select and install for wide control range.

C. Ball Valves: Provide for field installation between the unit and the supply/return lines of the loop to stop water flow to the unit in a maintenance or service situation.

D. Cabinet:
1. Construct of 18 gauge galvanized steel with exposed edges rounded.
2. Finish: Factory apply electrostatic powder paint or baked enamel, available in multiple colors for an appliance grade finish.
3. Provide access panel for inspection and servicing of refrigerant, coils, fan section, and controls.
4. Insulation:
a. Material: Minimum 1/2 inch thick, dual density, bonded glass fiber.
b. Provide moisture resistant insulation for the internal parts and surfaces exposed to the conditioned air stream.
c. Exposed Side of Insulation: High density erosion proof material suitable for use in air streams up to 4500 fpm.
d. Provide flame spread of less than 25, and a smoke developed classification of less than 50 in accordance with UL 723.
5. Include electrical box for the entrance of line voltage with separate knockout for control wiring.

E. Drain Pan:
1. Construct of corrosion resistant material and factory insulated to prevent sweating.
2. Slope drain pan on two planes to pitch condensate to drain connection.

F. Fans:
1. Type: Blow-through configuration.
2. Construction: Corrosion resistant, galvanized material.

G. Filters:
1. Minimum 1/2 inch thick throwaway filters.
2. Average Resistance: 76 percent.
3. Dust Holding Capacity: 26 grams per sq ft.

H. Motors:
1. Multi-speed permanent split capacitor with thermal overload protection.
2. High, low switching device, accessible behind the hinged control door.
3. Quick-disconnect plug.
4. Permanently lubricated bearing.

I. Refrigerant Metering: Provide thermal expansion valve or capillary expansion tube(s) allowing the operation of the unit with EFT in the range of 25 degrees F to 120 degrees F.

J. Compressor:

1. High efficiency rotary compressor.
2. External Vibration Isolation:
   a. Provide rubber mounting devices located underneath compressor mounting base.
   b. Support refrigeration assembly under compressor mounting base with additional isolation.
3. Thermal Overload Protection:
   a. High pressure switch for protection against excessive discharge pressure.
   b. Low pressure switch for protection against loss of refrigerant charge.

K. Water-To-Refrigerant Heat Exchanger:
1. Construction: High quality co-axial coil for maximum heat transfer.
2. Coil Material: Deeply fluted copper inner tubes with same material for outer tube.
3. Provide rubber isolation to the heat exchanging device for enhanced sound attenuation.
4. Working Pressure:
   a. Water Side: Minimum 400 psi.
   b. Refrigerant Side: Minimum 450 psi.

L. Unit Controls:
1. All heat pumps are to be provided will all materials necessary to interconnect to the existing building automation system. Provide BACNET Module for each unit and interface to BAS. The existing BAS is Trane TRACER Summit. Verify all materials necessary to connect to BAS prior to bidding.
2. Factory mounted and wired controls for sequenced operation of compressor, blower, reversing valve, and system accessories.
3. Power Source for Low Voltage Controls: 24 V, minimum 75 VA transformer with integral circuit breaker.
4. Safety lockout control with refrigerant high-pressure switch.
5. EMS relay.
6. Refrigerant low-pressure or loss of charge switch.
7. Water freeze protection.
8. Lockout Circuit: Resettable by resetting the low voltage power supply or the main circuit breaker.
9. Microprocessor Control (Factory-Installed): Sequences all unit functions, including condensate overflow protection, and modes of operation including auxiliary heat.
10. Thermostats:
    a. Electronic: Provide non-programmable.

2.04 HOSE KITS AND VALVES

A. Hoses:
1. Provide hoses for all units for connection to main water supply and return headers.
2. Length: 2 feet.
3. Material: Braided stainless steel rated to minimum 400 psi at 265 degrees F.

B. Automatic Balancing Valves:
1. Brass body for shutoff and hydronic balancing.
2. Manufacturers:
   a. Hays Fluid Controls; Automatic Balancing Valves: www.haysfluidcontrols.com/#sle.
   b. Substitutions: See Section 01 6000 - Product Requirements.

C. Ball Valves:
1. Brass body for shutoff and hydronic balancing.
2. Provide memory, memory stop, and pressure/temperature ports.

D. Y Strainers:
1. Bronze body.
2. "Y" type configuration with brass cap.
3. Maximum Operating Pressure: Minimum 450 psi.
4. Screen: Stainless steel.

E. Auto-flow regulators as indicated in the schedule.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Floor Mounted Unit(s):
   1. Support on neoprene pads with 0.125 inch minimum static deflection.

C. Suspended Units: Suspend from structure with threaded steel rods and 0.25 inch minimum static deflection rubber-in-shear vibration isolators.

D. Coordinate installation of units with architectural, mechanical, and electrical work.

E. On water coils, provide shut-off valve on supply line and balancing valve on return line. Provide manual air vents at high points complete with stop valve.

F. Install wall mounted thermostats, humidistats, and switch controls in electrical outlet boxes at heights designated by Engineer.

3.02 CONNECTIONS

A. Connect supply/return hydronic piping to heat pump with unions and shut-off valves.

B. Connect condensate drain pan to indirect waste connection with a P-trap of adequate depth to seal against fan pressure.

C. Connect supply/return air ducts to WSHPs with flexible connectors (not flex duct) in accordance with Section 23 3300 - Air Duct Accessories. make smooth tapered transitions to existing duct following SMACNA standards.

D. Installation of piping adjacent to heat pump to allow for maintenance and service.

E. Field Install all electrical devices provided by the heat pump manufacturer not specified to be factory-installed.

3.03 SYSTEM STARTUP

A. Provide manufacturer's field representative to perform systems startup.

B. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Provide manufacturer's field representative to test and inspect.

C. Inspect for and remove blocks, shipping bolts, and tie-down straps.

D. Test the heat pumps for performance compliance upon completion of the installation and energization of all electrical circuitry.

E. Operational Test: Start units to confirm unit operation and motor rotation.

F. Controls and Safety Switches: Test, adjust, and replace damaged/malfunctioning controls and equipment.

G. Coordinate all temperature control work with the BAS Control Manufacturer, Section 23 0993 - Sequence of Operations for HVAC Controls.

H. Malfunctioning Units: Remove, replace, and retest as specified above.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to the designated representative of the Owner.

B. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of one day of training.

3. Instructor: Manufacturer's training personnel.
4. Location: At project site.

END OF SECTION

SECTION 26 0001

BASIC ELECTRICAL MATERIALS AND METHODS

GENERAL REQUIREMENTS

1.01 CONFORM TO THE CURRENT REQUIRMENTS OF THE NEC - 2020

1.02 PERFORM ALL WORK UNDER THIS SECTION IN ACCORDANCE WITH APPLICABLE CODES & STANDARDS AND BEST INDUSTRY AND TRADE PRACTICES.

1.03 COORDINATE ALL WITH WITH OTHER TRADES PRIOR TO BIDDING. THIS IS A RENOVATION PROJECT.

1.04 SUSPECT MATERIAL: SHOULD THE CONTRACTOR ENCOUNTER SUSPECTED ACM MATERIAL, THEY ARE TO STOP WORK IN THE AFFECTED AREA AND NOTIFY THE OWNER AND ENGINEER. THE OWNER WILL ARRANGE FOR TESTING IF THE EXISTING ACM DOCUMENTATION IS UNCLEAR. REMEDIATION OF ACM IS NOT INCLUDED IN THIS PROJECT SCOPE BY THE CONTRACTOR.

MATERIALS & METHODS

2.01 BEST INDUSTRY PRACTICES

A. Contractor will employ best industry practices and utilize the materials and methods found within the project drawings and specifications.

2.02 WIRING METHODS (UNLESS SPECIFIED ELSEWHERE)

A. **Conductors And Cables:**
   1. Insulated Single Conductors (600 Volts And Below):
      a. Temperature Rating: 75 deg C.
      b. Stranded Conductor Branch Circuits: Larger than 10 AWG: copper, 600 volt, THHN insulation.
      c. Solid Conductor Branch Circuits 10 AWG and smaller: copper, 600 volt, THHN insulation.
      d. Control Circuit Conductors: Copper, stranded, 300 volt, THHN insulation.
   2. Insulated Multiple Conductor Cable:
      a. Jacketed:
         1) Unshielded.
   3. Armored Cable:
      a. Type MC.
   4. Terminating Devices:
      a. Cable lugs.
      b. Cable connectors.
      c. Splices and terminals:
         1) Spring wire for sizes #10 and smaller.
   5. Accessories:
      a. Cable grips.
      b. Conductor harness.
      c. Wire pulling lubricant.
      d. Electrical insulating tape.
      e. Conductor identifying markers.

B. Raceways And Boxes:
   1. Conduit And Electrical Tubing:
      a. Electrical Metallic Tubing (EMT) And Fittings:
         1) EMT: Thin wall ferrous steel tubing, hot dipped, galvanized, smooth interior reamed ends.
         2) Fittings and Conduit Bodies: Steel set-screw.
      b. Plastic Conduit and Fittings:
         1) Conduit: Schedule 40 PVC.

2) Fittings And Conduit Bodies: PVC.
c. Conduit Supports, Clamps, and Straps: Steel.
d. Enclosures And Cabinets: Steel.

2. Junction Boxes: Rated for application, galvanized steel with conduit knockouts and threaded holes for mounting wiring devices. Conform to requirements of NEMA 250.
   a. Minimum Sizes:
      1) Octagonal: 4 inch (102 mm) wide by 1.5 inch (38 mm) deep.
      2) Square: 4 inch (102 mm) square by 1.5 inch (38 mm) deep.
      3) Dry Locations: Galvanized sheet steel, NEMA 1, welded seams and cover held by stainless steel fasteners.
      4) Damp or Wet Locations: Cast malleable iron with corrosion finish, NEMA 3R, threaded conduit entries, neoprene coverplate gasket, and coverplate held by stainless steel fasteners.
3. Outlet Boxes: Rated for application, galvanized steel with conduit knockouts and threaded holes for mounting wiring devices. Conform to requirements of NEMA 250.
   a. Minimum Sizes:
      1) Single Device: 3 inch (76 mm) high by 2 inch (51 mm) wide by 2 inch (51 mm) deep.
      2) Gang Device: 3 inch (76 mm) high by 2 inch (51 mm) wide (per gang) by 2 inch (51 mm) deep.
      3) Dry Locations: Galvanized sheet steel, NEMA 1, welded seams and cover held by stainless steel fasteners.
      4) Damp or Wet Locations: Cast malleable iron with corrosion finish, NEMA 3R, threaded conduit entries, neoprene coverplate gasket, and coverplate held by stainless steel fasteners.
4. Pull Boxes: Comply with requirements of NEMA 250.
   a. Dry Locations: Galvanized sheet steel, NEMA 1, welded seams and cover held by stainless steel fasteners.
   b. Damp or Wet Locations: Cast malleable iron with corrosion finish, NEMA 3R, threaded conduit entries, neoprene coverplate gasket, and coverplate held by stainless steel fasteners.
5. Masonry Boxes: Galvanized steel with conduit knockouts and threaded holes for mounting devices. Designed and rated for mounting in masonry walls.
6. Plumbing fixture requirements: Provide boxes, wiring, devices as required to properly install plumbing devices with electrical requirements. Items include but not limited to: lavatories, water closet flush valves, pumps, etc. Verfiy requirements prior to bidding.
7. Mechanical System Requirements: Provide boxes, disconnects, starters, wiring, devices, etc as required by all mechanical systems. Verify requirements prior to bidding.
8. Conduit application schedule:
   a. Schedule 40 Plastic (PVC) Conduit: Concealed under slab on grade and Exterior underground.
   b. Electrical Metallic Tubing (EMT): Concealed interior locations and Mechanical Areas.
   c. Flexible Metal Conduit: Connections between accessible junction boxes and lighting fixtures, in dry locations and Equipment connections.

2.03 LOW-VOLTAGE DISTRIBUTION

A. Enclosed Switches: Steel dead front enclosure.

B. Enclosed Circuit Breakers: Steel deadfront enclosure.

2.04 LIGHTING

A. Interior Luminaires: As indicated on drawings.

END OF SECTION

SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

PART 3 EXECUTION

2.01 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Demolition drawings are based on casual field observation and existing record documents.

C. Report discrepancies to Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

2.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
   2. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Notify local fire service.
   3. Make notifications at least 72 hours in advance.
   4. Make temporary connections to maintain service in areas adjacent to work area.

F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner at least 72 hours before partially or completely disabling system.
   2. Notify telephone utility company at least 72 hours before partially or completely disabling system.
   3. Make temporary connections to maintain service in areas adjacent to work area.

2.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

2.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

I. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

Q. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
         1) Maximum Length: 6 feet.
      b. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
         1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
   2. In addition to other applicable restrictions, may not be used:
      a. Where not approved for use by the authority having jurisdiction.
      b. Where exposed to damage.
      c. For damp, wet, or corrosive locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

H. Conductor Material:
1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
a. Exceptions:
1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
2. Control Circuits: 14 AWG.

J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

K. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
3. Color Code:
a. 480Y/277 V, 3 Phase, 4 Wire System:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.
b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. Equipment Ground, All Systems: Green.
d. Travelers for 3-Way and 4-Way Switching: Purple.
e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
f. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Installed Underground: Type THHN/THWN or THHN/THWN-2.

2.04 METAL-CLAD CABLE

A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

B. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Grounding: Full-size integral equipment grounding conductor.

F. Armor: Steel, interlocked tape.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use compression connectors.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
   3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

H. Mechanical Connectors: Provide bolted type or set-screw type.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight;

conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

E. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
      a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required to account for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

M. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.

3. Wet Locations: Use heat shrink tubing.

O. Insulate ends of spare conductors using vinyl insulating electrical tape.

P. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   1. Do not use conductors smaller that #6 AWG for grounding electrode system.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
    a. Exceptions:
        1) Use bare copper conductors where installed underground in direct contact with earth.
        2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Oxide Inhibiting Compound: Comply with Section 26 0519.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 0553.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. Requirements of authorities having jurisdiction.
   2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 1.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or stainless steel unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
   3. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
   1. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.
   2. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
   4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
   5. Manufacturers:

a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
b. Thomas & Betts Corporation: www.tnb.com/#sle.
c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.
e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
e. Outlet Boxes: 1/4 inch diameter.

F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Powder-actuated fasteners are not permitted.
8. Hammer-driven anchors and fasteners are not permitted.
9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
a. Comply with MFMA-4.
b. Channel Material: Use galvanized steel.
c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
10. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
11. Manufacturers - Mechanical Anchors:
a. Hilti, Inc: www.us.hilti.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Engineer.

H. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Conduit Support and Attachment: Also comply with Section 26 0533.13.

J. Box Support and Attachment: Also comply with Section 26 0533.16.

K. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

L. Secure fasteners according to manufacturer's recommended torque settings.

M. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Flexible metal conduit (FMC).

C. Liquidtight flexible metal conduit (LFMC).

D. Electrical metallic tubing (EMT).

E. Conduit fittings.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.

C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

D. Section 26 0529 - Hangers and Supports for Electrical Systems.

E. Section 26 0533.16 - Boxes for Electrical Systems.

F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

I. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

J. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

K. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for fittings.

C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

C. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

D. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
1. EMT conduit is permitted only in damp locations if compression fittings are used.

E. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
1. Locations subject to physical damage include, but are not limited to:
a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
b. Where exposed below 20 feet in warehouse areas.

G. Exposed, Exterior: Use galvanized steel rigid metal conduit.

H. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

I. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
1. Maximum Length: 6 feet.

J. Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit.
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
3. Maximum Length: 6 feet unless otherwise indicated.
4. Vibrating equipment includes, but is not limited to:
a. Transformers.
b. Motors.

K. Fished in Existing Walls, Where Necessary: Use flexible metal conduit or MC cable.

2.02 CONDUIT REQUIREMENTS

A. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 1/2 inch (16 mm) trade size.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.06 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.
   4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.07 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

C. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   9. Arrange conduit to provide no more than 150 feet between pull points.
   10. Route conduits above water and drain piping where possible.
   11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Hot water piping.
      c. Flues.
   13. Group parallel conduits in the same area together on a common rack.

E. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
   4. Use conduit strap to support single surface-mounted conduit.
      a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
   5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.

6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use of wire for support of conduits is not permitted.
9. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

F. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

G. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

H. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
   b. Under Slab on Grade: 12 inches to bottom of slab.
2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length.

I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

J. Conduit Sealing:

1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.
   b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

K. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

L. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

M. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
   5. Use raised covers suitable for the type of wall construction and device configuration where required.
   6. Use shallow boxes where required by the type of wall construction.
   7. Do not use "through-wall" boxes designed for access from both sides of wall.
   8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
   3. Junction and Pull Boxes Larger Than 100 cubic inches:
      a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
      b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
   10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
   11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.
      c. Electrical rooms.
      d. Mechanical equipment rooms.

H. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

N. Close unused box openings.

O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

P. Provide grounding and bonding in accordance with Section 26 0526.

Q. Identify boxes in accordance with Section 26 0553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Warning signs and labels.

1.02 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for identification labels, underground warning tape, and warning signs and labels.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.06 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.
         4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

b. Enclosed switches:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
3. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
5. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
a. Service equipment.
b. Industrial control panels.
c. Motor control centers.
d. Elevator control panels.
e. Industrial machinery.
6. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
a. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
a. Within boxes when more than one circuit is present.
b. Within equipment enclosures when conductors and cables enter or leave the enclosure.
4. Use underground warning tape to identify direct buried cables.

C. Identification for Raceways:
1. Use color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
1) Color Code:
(a) Fire Alarm System: Red.
2) Field-Painting: Comply with Section 09 9123.
3) Vinyl Color Coding Electrical Tape: Comply with Section 26 0519.

D. Identification for Boxes:

1. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
    a. For exposed boxes in public areas, use only identification labels.

E. Identification for Devices:
1. Use identification label to identify fire alarm system devices.
    a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
    a. Use only for indoor locations.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
    a. System designation where applicable:
        1) Fire Alarm System: Identify with text "FIRE ALARM".
    b. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
    a. System Designation: 1 inch.
    b. Equipment Designation: 1/2 inch.
5. Color:
    a. Normal Power System: White text on black background.
    b. Fire Alarm System: White text on red background.

D. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
   2. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      a. Do not use labels designed to be completed using handwritten text.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.
   8. Boxes: Outside face of cover.
   9. Conductors and Cables: Legible from the point of access.
   10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MATERIALS

A. Flexible Conduit: As specified in Section 26 0533.13.

B. Wire and Cable: As specified in Section 26 0519.

C. Boxes: As specified in Section 26 0533.16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 2813
FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 RELATED REQUIREMENTS

A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

B. Section 26 2816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
      a. Fusible Enclosed Switches: See Section 26 2816.16.
   2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
   3. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Fuses: One set(s) of three for each type and size installed.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com.

B. Mersen (formerly Ferraz Shawmut): ferrazshawmut.mersen.com.

C. Littelfuse, Inc: www.littelfuse.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 APPLICATIONS

A. General Purpose Branch Circuits: Class RK1, time-delay.

B. Individual Motor Branch Circuits: Class RK1, time-delay.

2.03 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

H. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Project Record Documents: Record actual locations of enclosed switches.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. General Electric Company: www.geindustrial.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Substitutions: See Section 01 6000 - Product Requirements.

E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Minimum Ratings:
      a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.

G. Provide with switch blade contact position that is visible when the cover is open.

H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
   1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

I. Conductor Terminations: Suitable for use with the conductors to be installed.

J. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

N. Heavy Duty Switches:
   1. Comply with NEMA KS 1.
   2. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 0529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 0526.

H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

I. Identify enclosed switches in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

E. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION